

# 2005 Groundfish Assessment Review Meeting II

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Northeast Fisheries Science Center  
NOAA Fisheries Service

Presentation to  
New England Fishery Management Council  
September 15, 2005



# *What the GARM Did*

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- Update landings, discard, and survey data
- Age samples from all sources
- Rerun existing models with new data
- Estimate fishing mortality rates (F) and spawning stock biomasses (SSB) for 2004 and all previous years in light of 2002-2004 data.
- Compare estimated F and B with predictions made in 2002.
- Recommend initial conditions for forecasts by Groundfish Committee

# ***What the GARM Did NOT Do***

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- ⊘ Revise or change assessment models
- ⊘ Revise reference points
  - GB Winter flounder is a special case
- ⊘ Evaluate the effectiveness of Amendment 13
  - only 7 months of implementation; models estimate annual rates)
- ⊘ Conduct projections

# What's in the Report?

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- Executive Summary
- Introduction
- Summary of Assessments (19 Chapters)
- Major Issues/Discussion
- Appendices
  - Summary of Groundfish Management Measures
  - Accuracy and Precision of Ageing Methods

<http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0513/>

# Underlying Data for GARM II

<b><i>Data Source</i></b>	<b><i>2002</i></b>	<b><i>2003</i></b>	<b><i>2004</i></b>	<b><i>Total</i></b>
Vessel Trip Reports	127,197	123,392	123,845	374,434
Dealer Transactions	205,200	207,722	202,847	615,769
Observed Trips	1,135	1,637	2,906	5,678
Observer Days	2,075	4,060	6,459	12,594
Port Samples	724	1,253	1,381	3,358
Commercial Lengths Measured	55,813	91,087	98,895	245,795
Total # Fish Aged	21,065	26,703	23,557	71,325
Number of Survey Stations (5 NEFSC surveys per year) + States	1474	1,406	1,500	4,380

# Who Participated?

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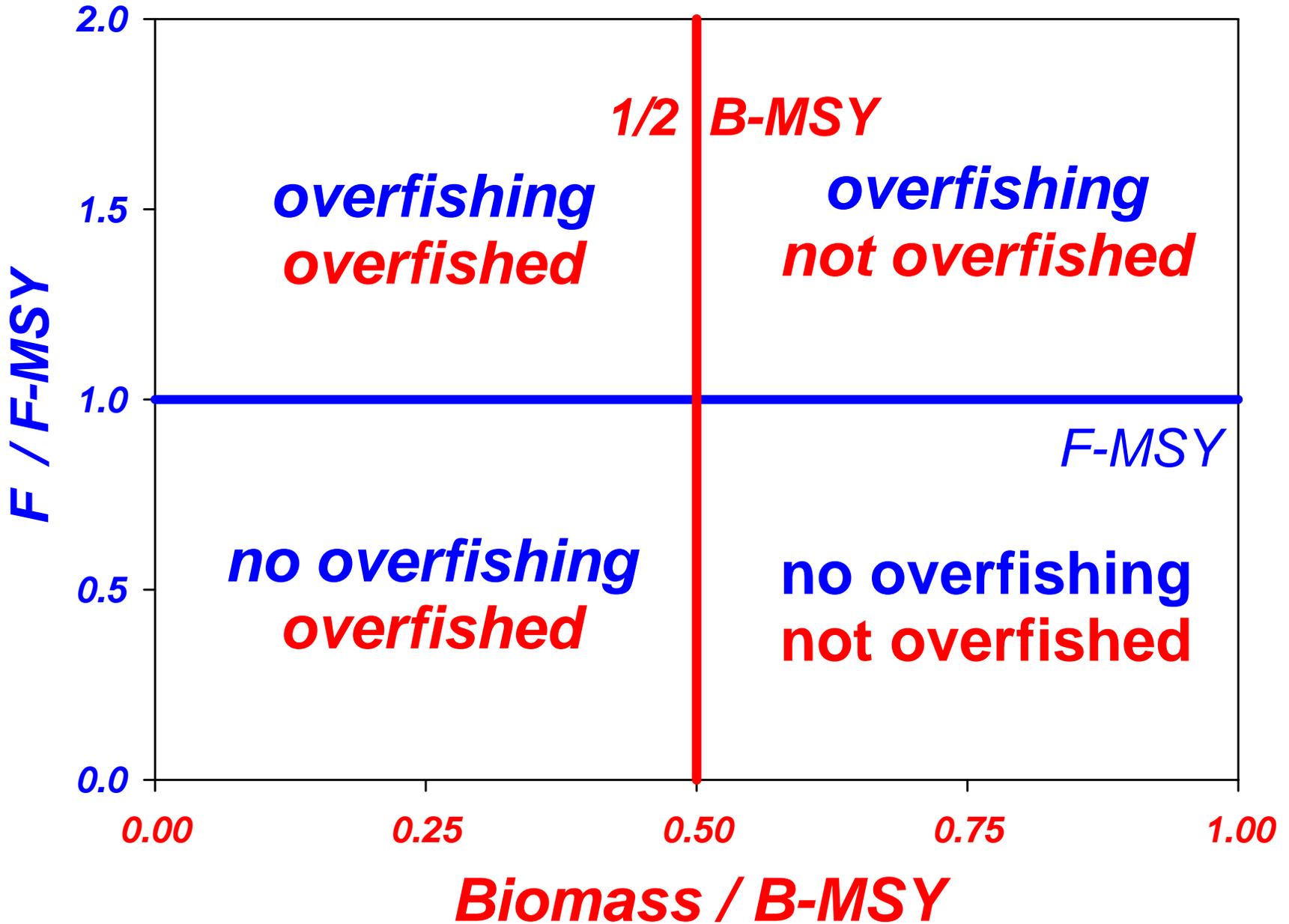
- GARM Panel External: Hoenig, Gilfillen, Sharov, Correia, Nies + NEFSC Assessment Scientists
- NEFSC groups: Pop Dy, Survey, Age & Growth, Observers, Data Management, Admin
- State fishery biologists
- Industry
- NGOs
- Council Staff: Nies
- Special acknowledgment to Ralph Mayo and Mark Terceiro as co-chairs.

# Overview

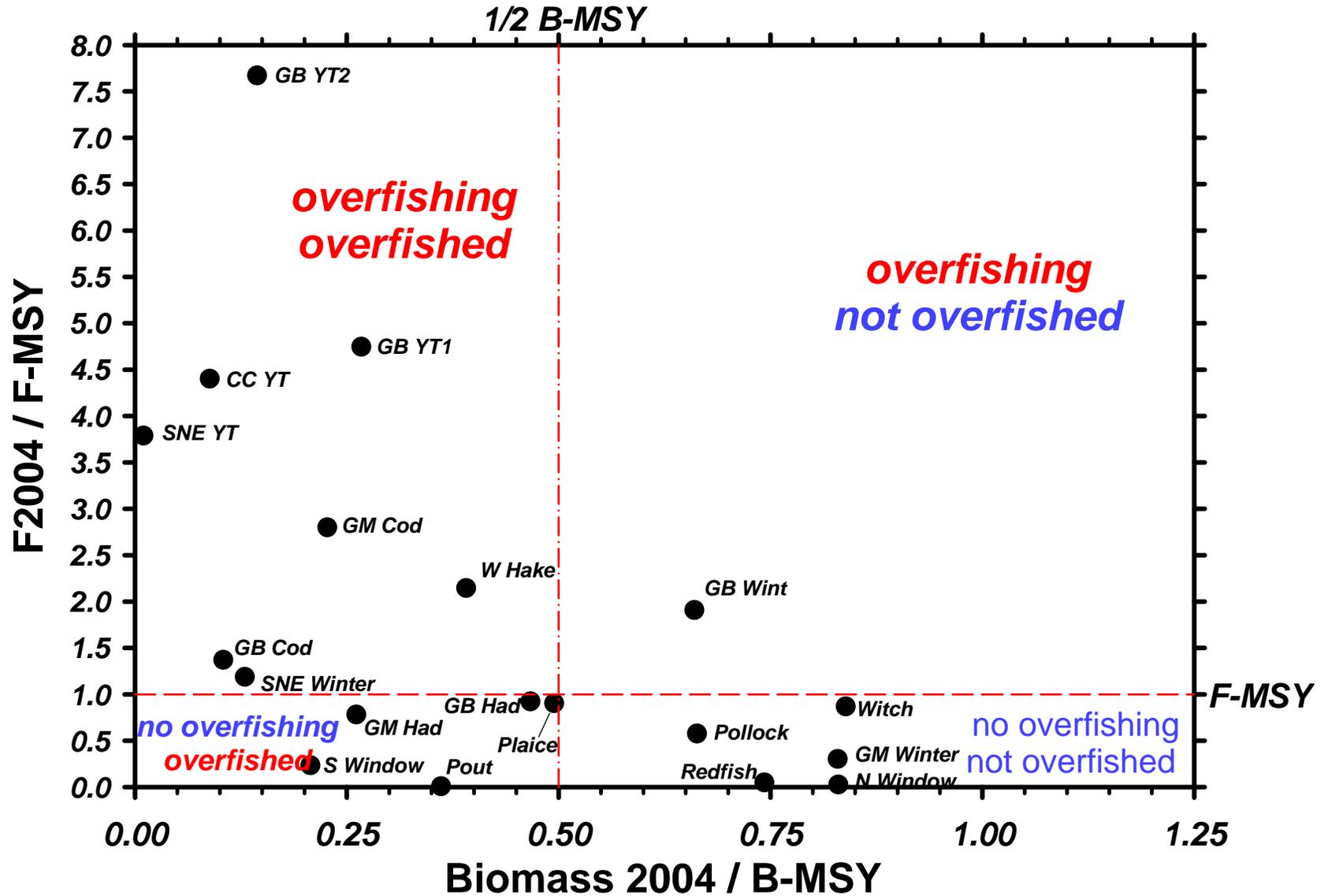
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- Summarize stock status in 2004 and revised estimates of stock status in 2001
- Highlight changes in biomass and fishing mortality between 2001 and 2004
- Highlight a few examples
  - Georges Bank Cod
  - Georges Bank Haddock
  - Georges Bank Yellowtail
  - Georges Bank Winter Flounder
- Discuss Retrospective Patterns
- Implications of reduced ave weight at age for some stocks

# Current Year Stock Status - Status Determination



# Groundfish Stock Status - 2004



# Comparisons of Stock Status: 2001 vs 2004. See Table 1.

Table entries are number of stocks

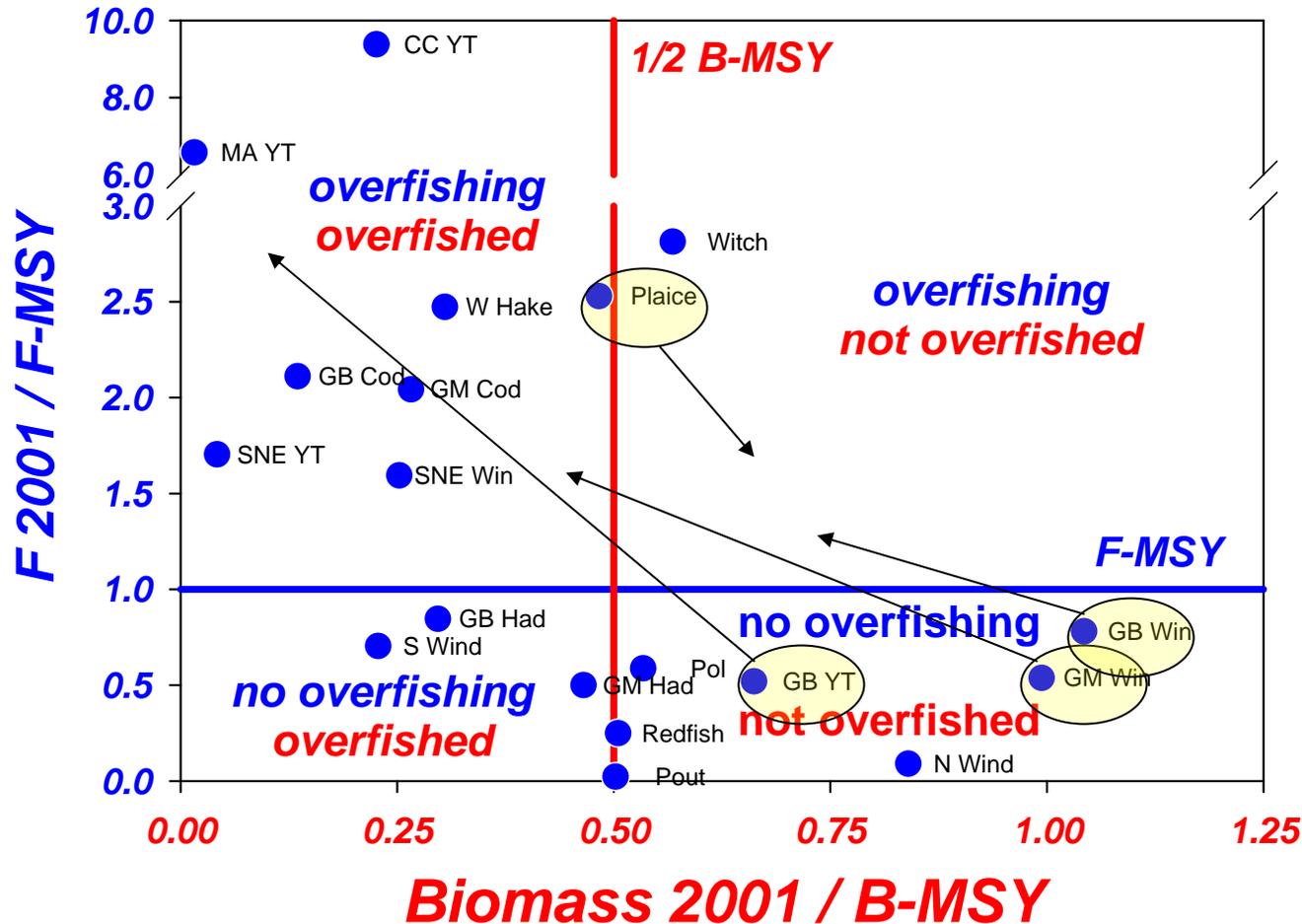
<b>Status 2001</b>	<b>B &lt; B<sub>MSY</sub> Over-fished</b>	<b>B &gt; B<sub>MSY</sub> NOT Over-fished</b>	<b>Total</b>
<b>F &gt; F<sub>MSY</sub> Over-fishing</b>	9	2	11
<b>F &lt; F<sub>MSY</sub> NO Over-fishing</b>	3	4	7
<b>Total</b>	12	6	18

<b>Status 2004</b>	<b>B &lt; B<sub>MSY</sub> Over-fished</b>	<b>B &gt; B<sub>MSY</sub> NOT Over-fished</b>	<b>Total</b>
<b>F &gt; F<sub>MSY</sub> Over-fishing</b>	7 -Witch, -GOM Winter	1 -Plaice	8
<b>F &lt; F<sub>MSY</sub> No Over-fishing</b>	5 +Plaice, +Pout	5 +Witch, +GOM Winter -Pout	10
<b>Total</b>	12	6	18

Atlantic halibut excluded; no estimate of F<sub>MSY</sub>

# How do present results for 2001 Status in 2005 compare to results from 2002 GARM?

## Groundfish Stock Status - 2001



### 2005 GARM

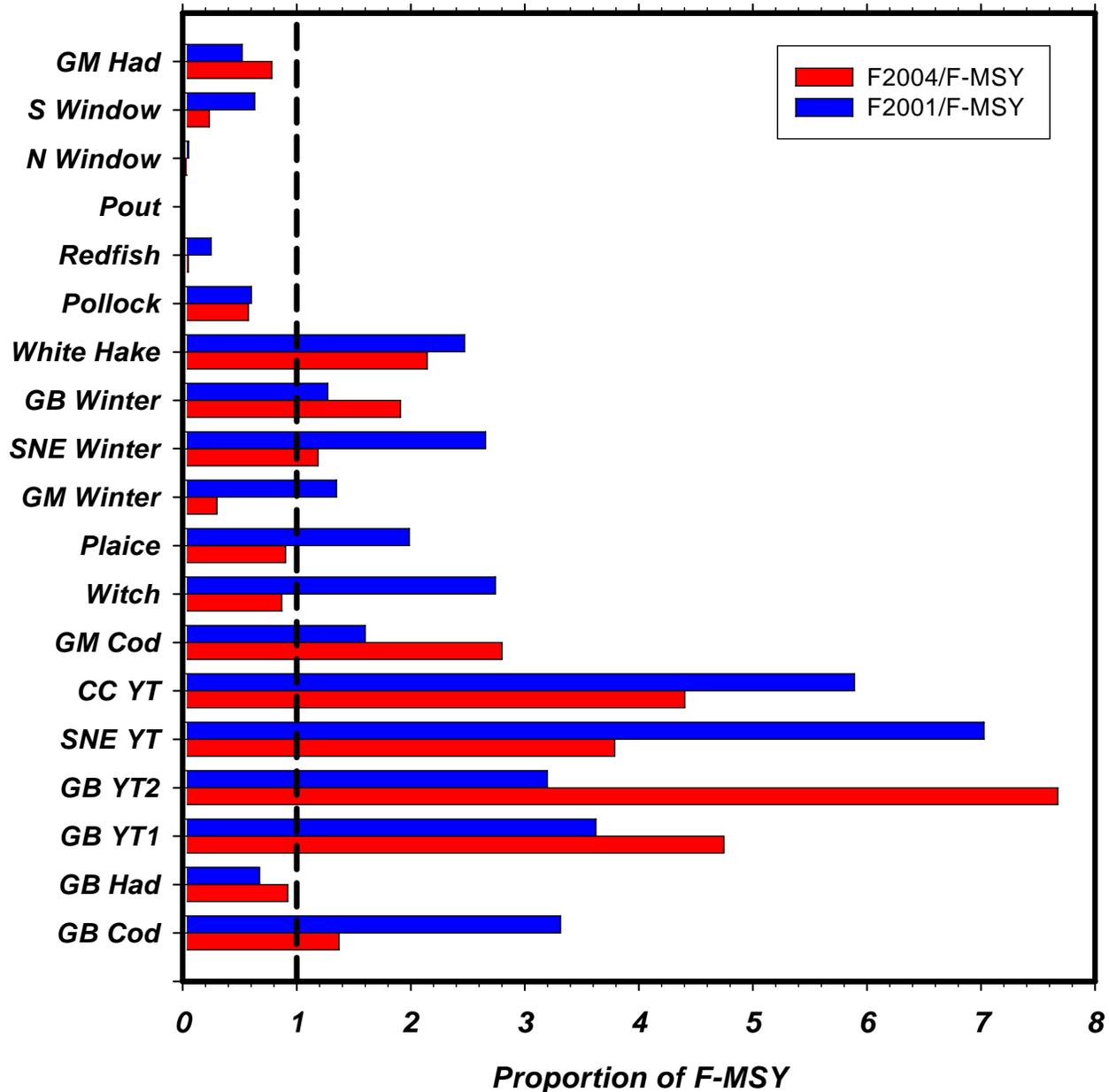
9	2
3	4

### 2002 GARM

7	1
3	7

NOTE: The above figure represents results of GARM I in 2002.

# *F 2001 and F 2004 as a Proportion of F-MSY*

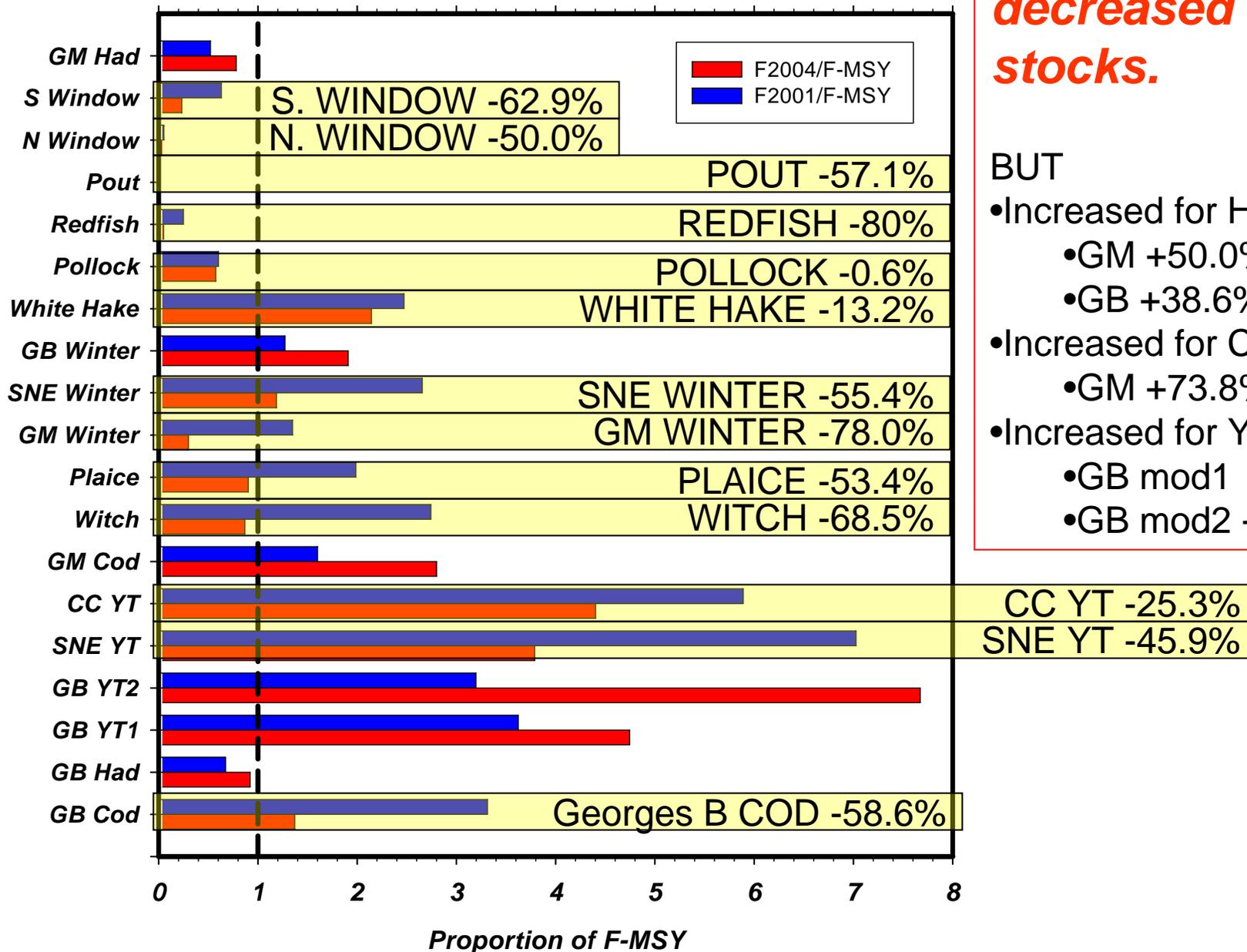


# F 2001 and F 2004 as a Proportion of F-MSY

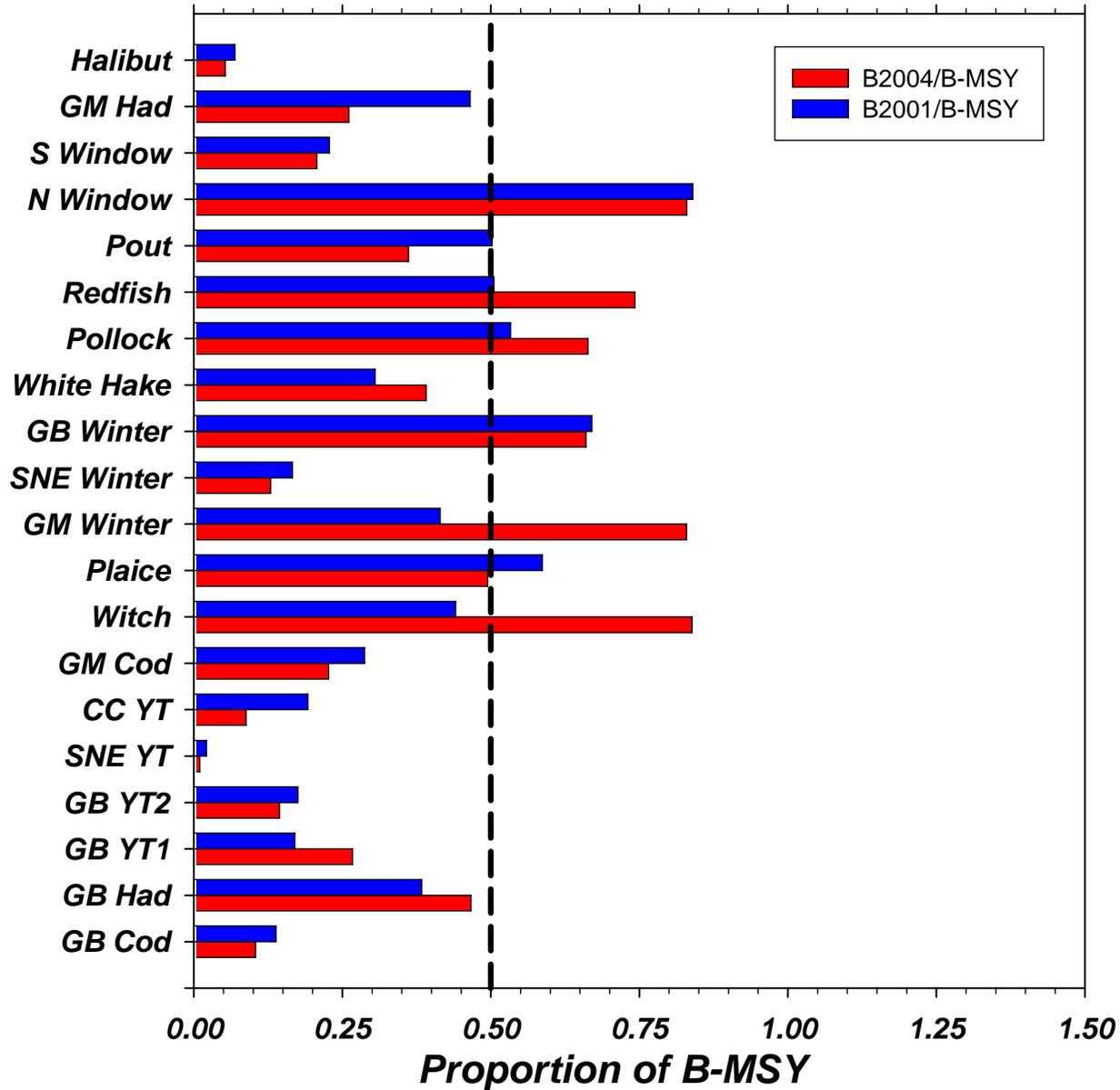
**Fishing mortality decreased in 13 stocks.**

**BUT**

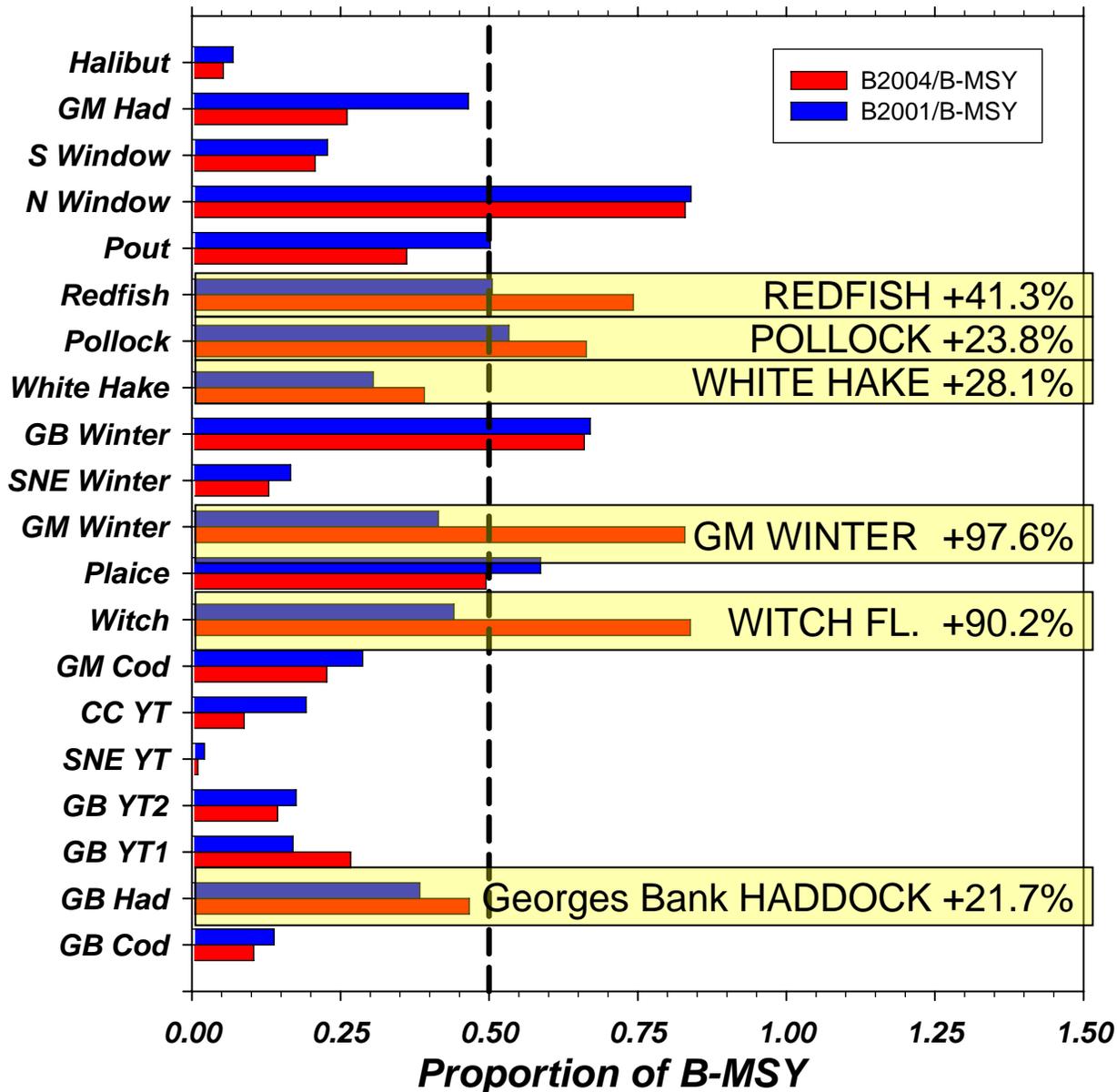
- Increased for Haddock
  - GM +50.0%
  - GB +38.6%
- Increased for Cod
  - GM +73.8%
- Increased for Yellowtail
  - GB mod1 +31.0%
  - GB mod2 +240%



## *B 2001 and B 2004 as a Proportion of B-MSY*



## B 2001 and B 2004 as a Proportion of B-MSY



Six stocks increased in biomass between 2001 and 2004.

**BUT**

- Both cod stocks declined
  - GB -24.9%
  - GM -21.1%
- GM Haddock -43.7%
- All 3 yellowtail flounder stocks declined
  - GB -17.5%
  - (Model 2)
  - SNE -52.7%
  - CC -44.2%

# Selected Stock Examples

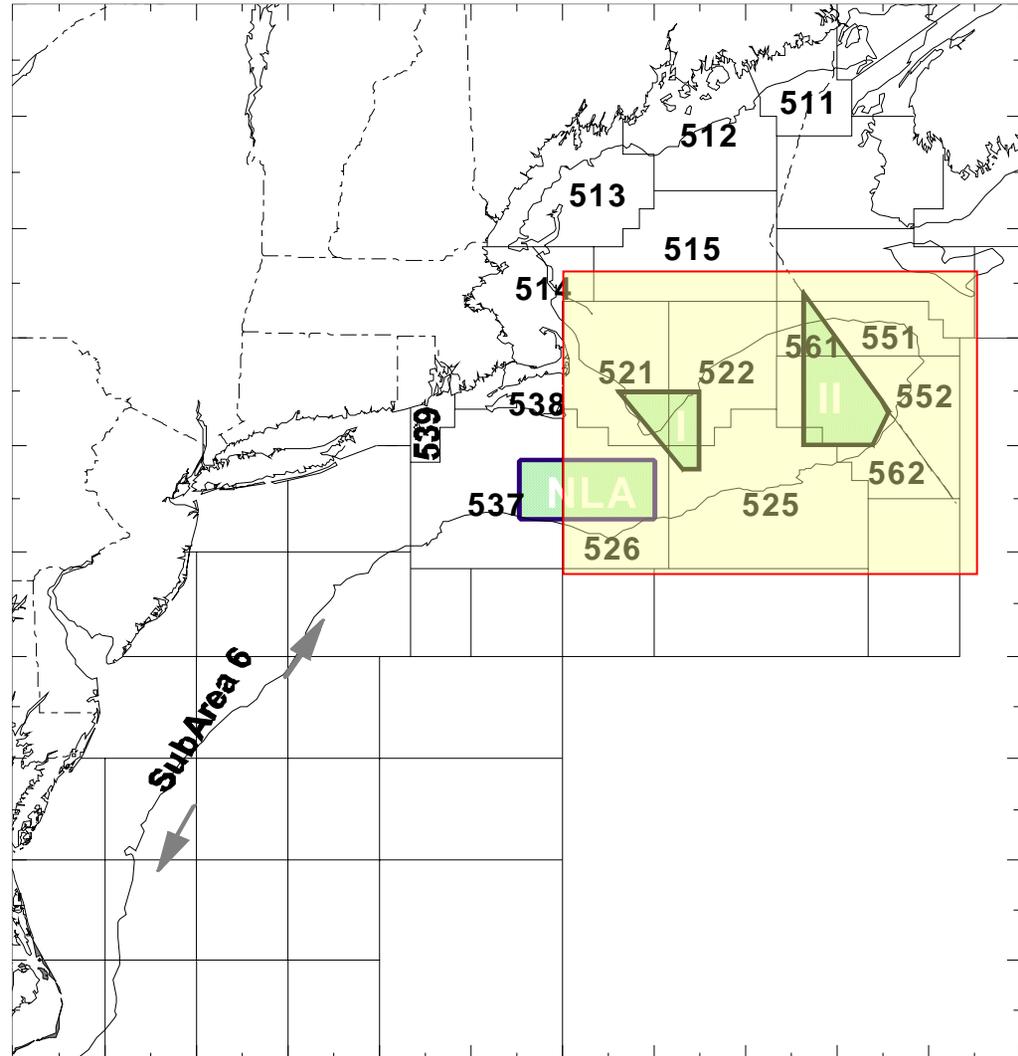
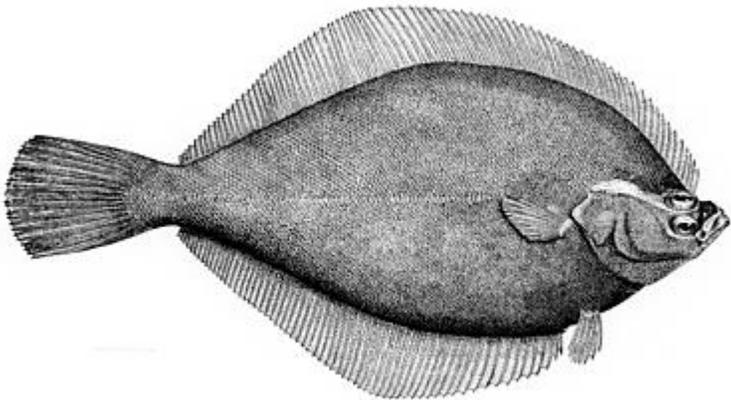
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- Georges Bank Yellowtail Flounder
- Georges Bank Cod
- Georges Bank Haddock
- Georges Bank Winter Flounder

# Georges Bank Yellowtail Flounder

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- Areas 522, 525, 561, 562, 551, 552

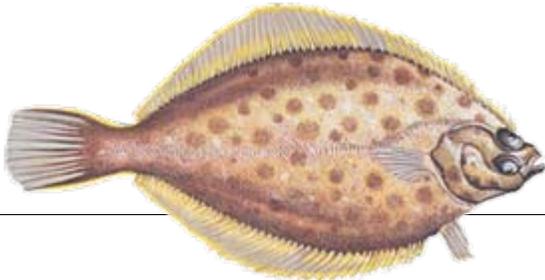


# **GB Yellowtail Fl. Management and Assessments**

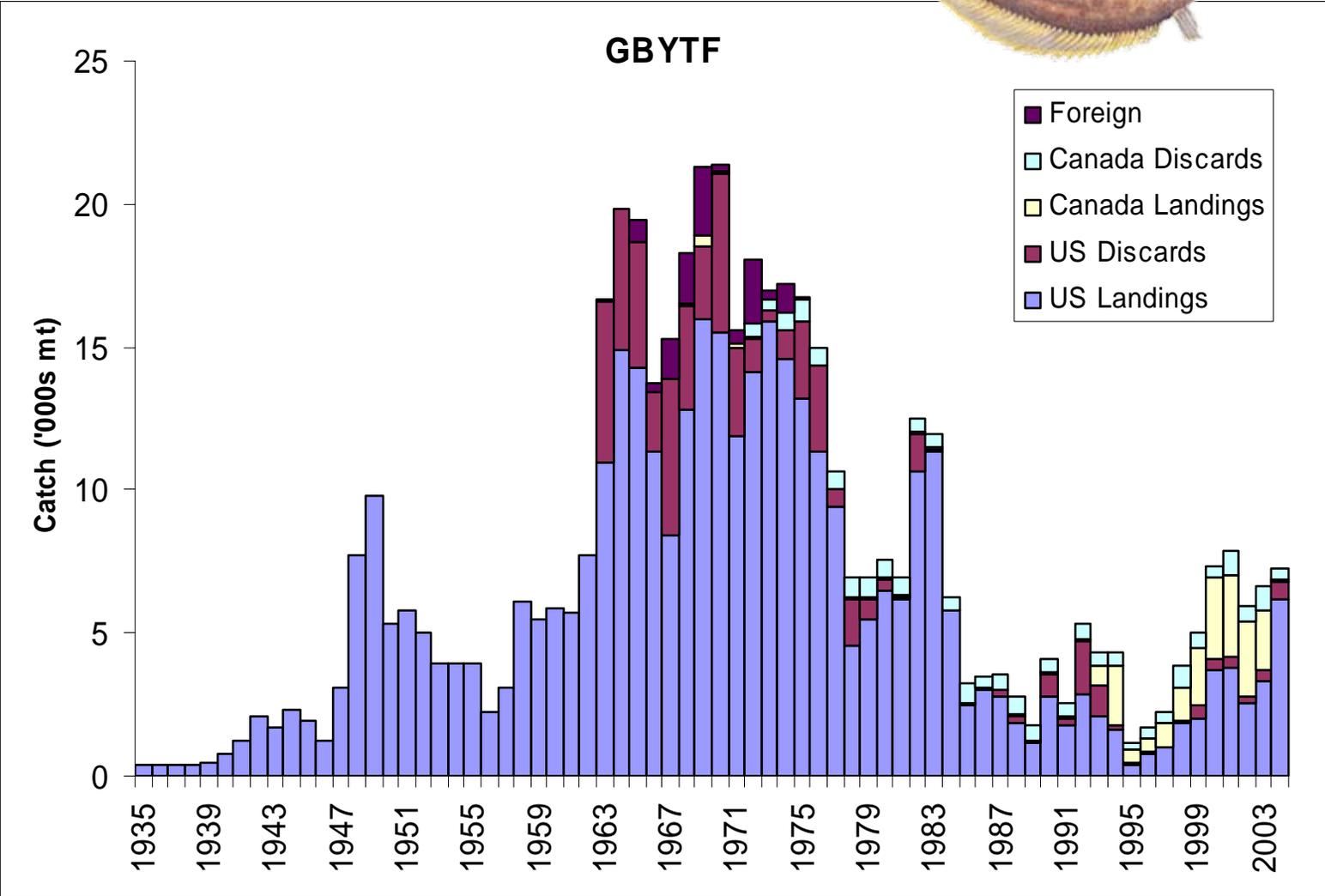
- Jointly managed stock – US and Canada
- Annual stock assessments – TRAC
  - Transboundary Resource Assessment Committee
- Management by hard quotas – TMGC
  - Transboundary Management Guidance Committee
- Quota allocation between countries based on past catches and surveys
- Multiple Assessments since 2002
  - 2002 GARM
  - 2003 TRAC
  - 2004 TRAC
  - 2005 Benchmark
  - 2005 TRAC
  - 2005 GARM



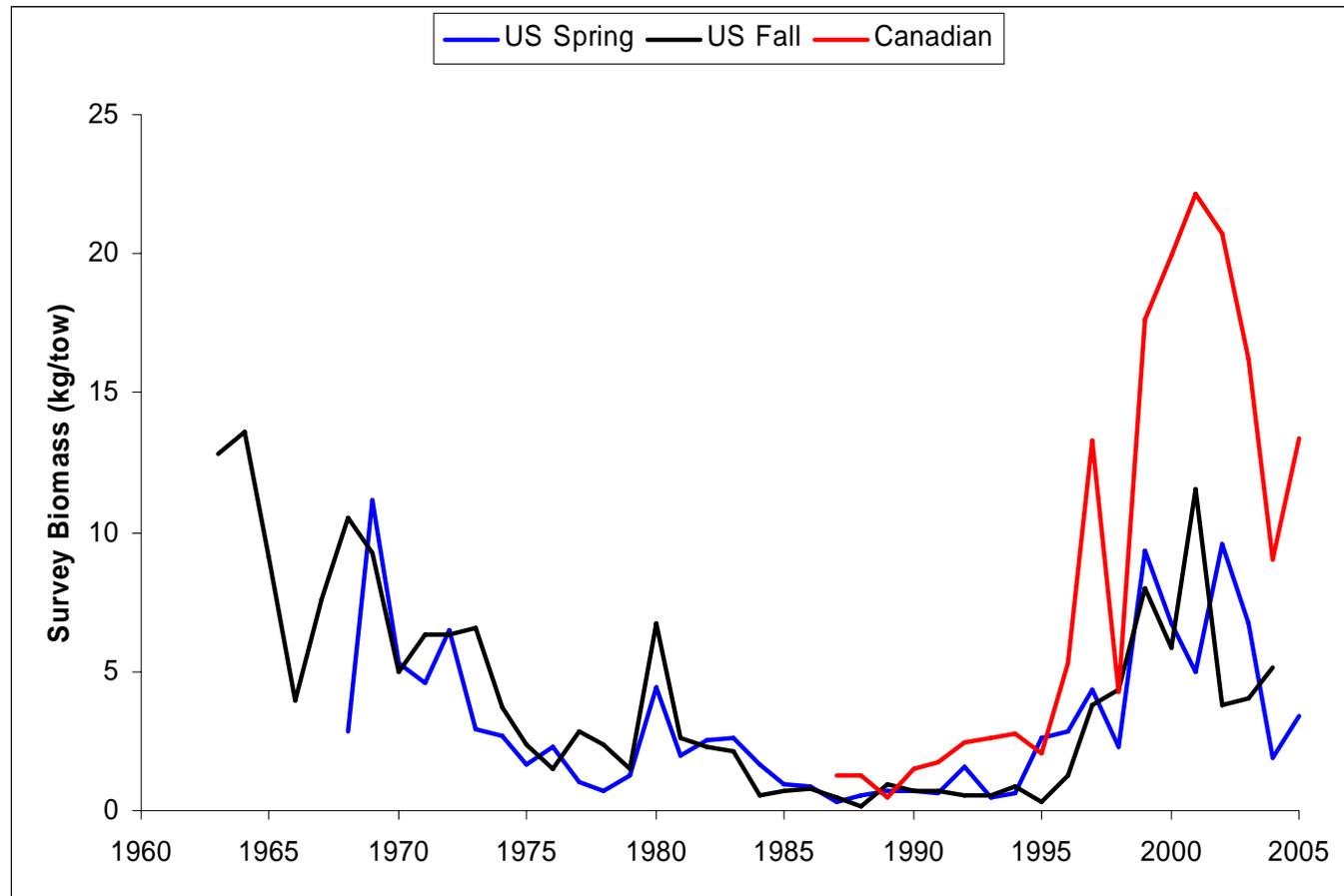
- Total catch about 7 kt since 2000
- US landings in 2004 highest since 1983
- Canadian landings in 2004 very low



# Catch

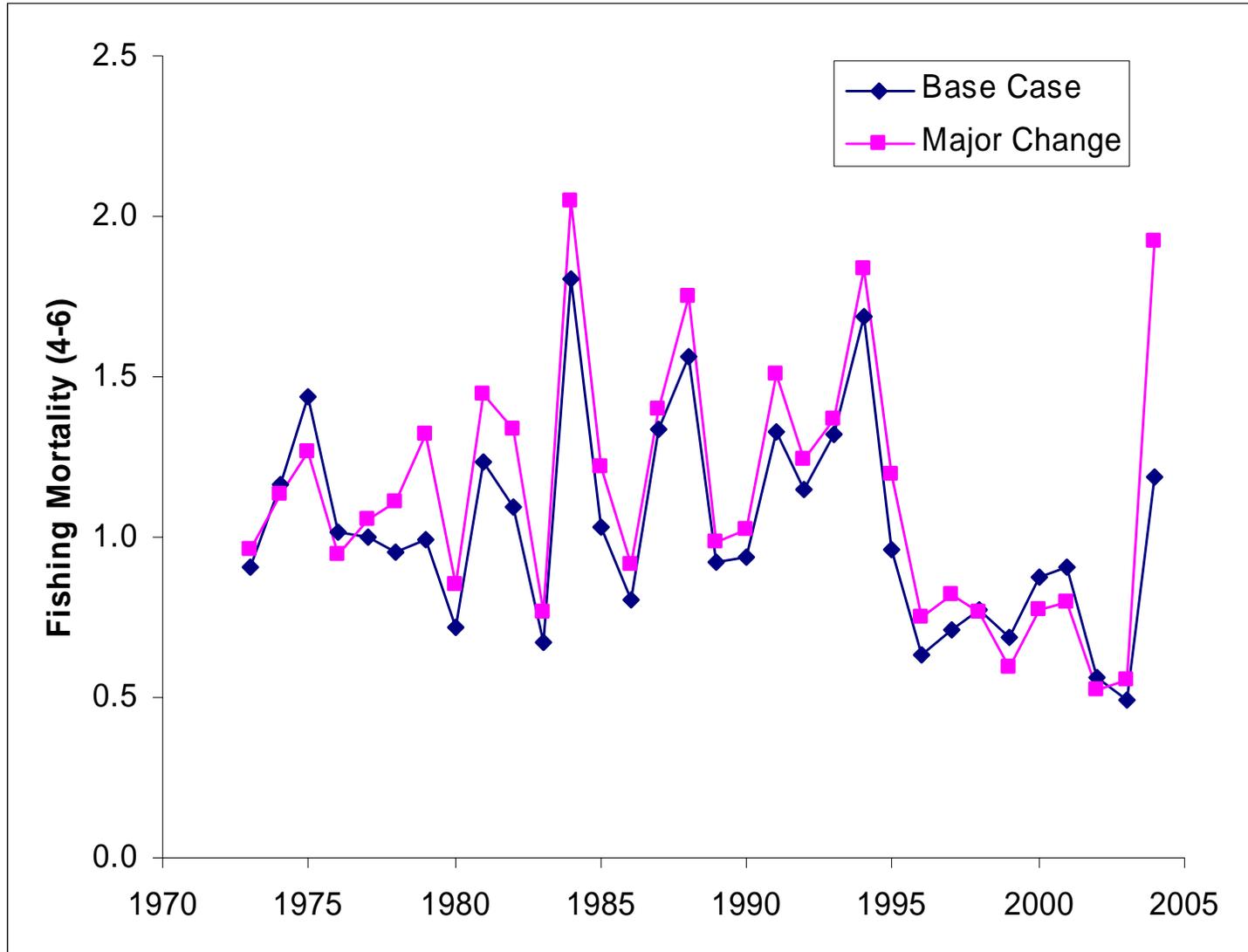


# Consistency of US and Canadian Research Vessel Surveys

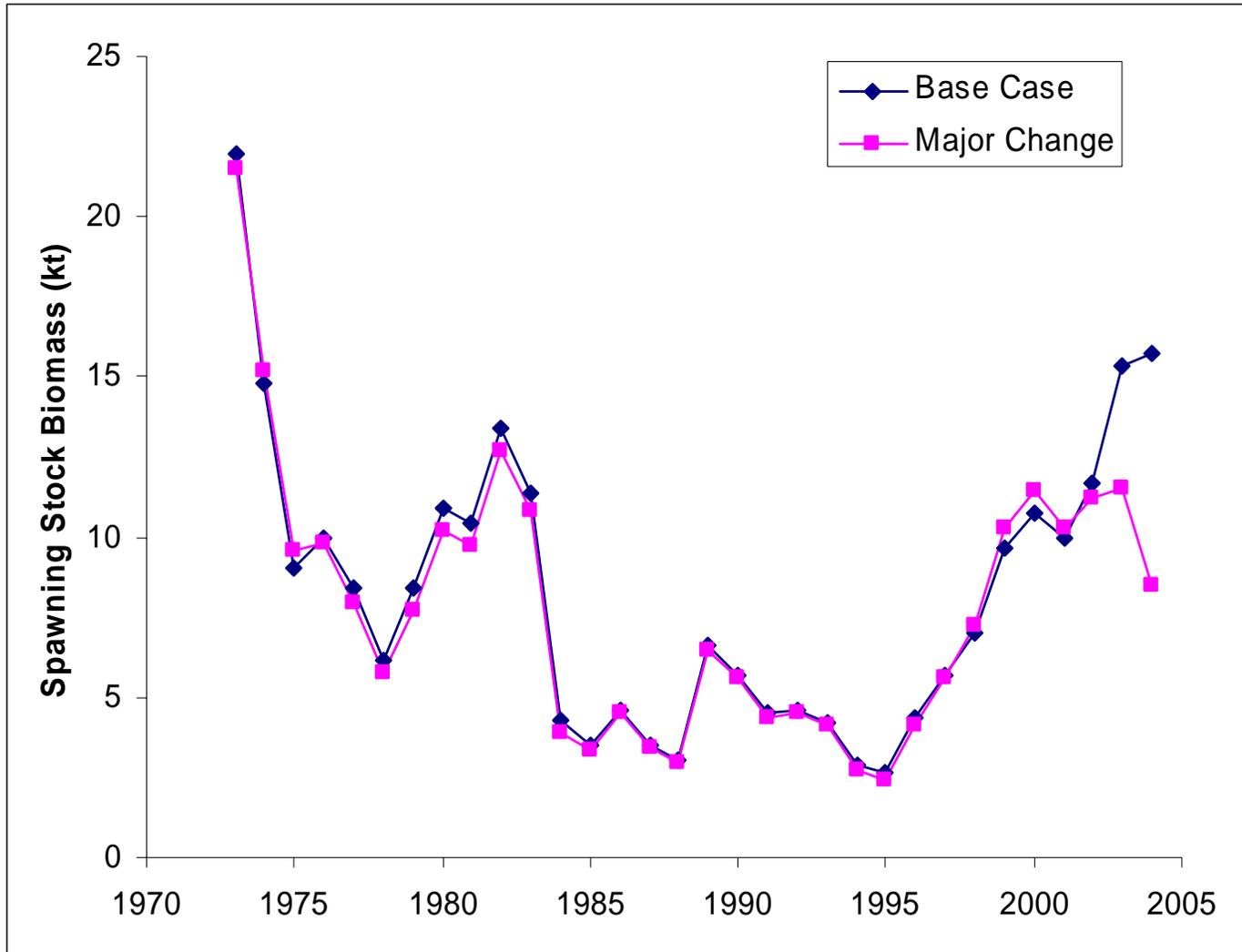


# VPA Results – F

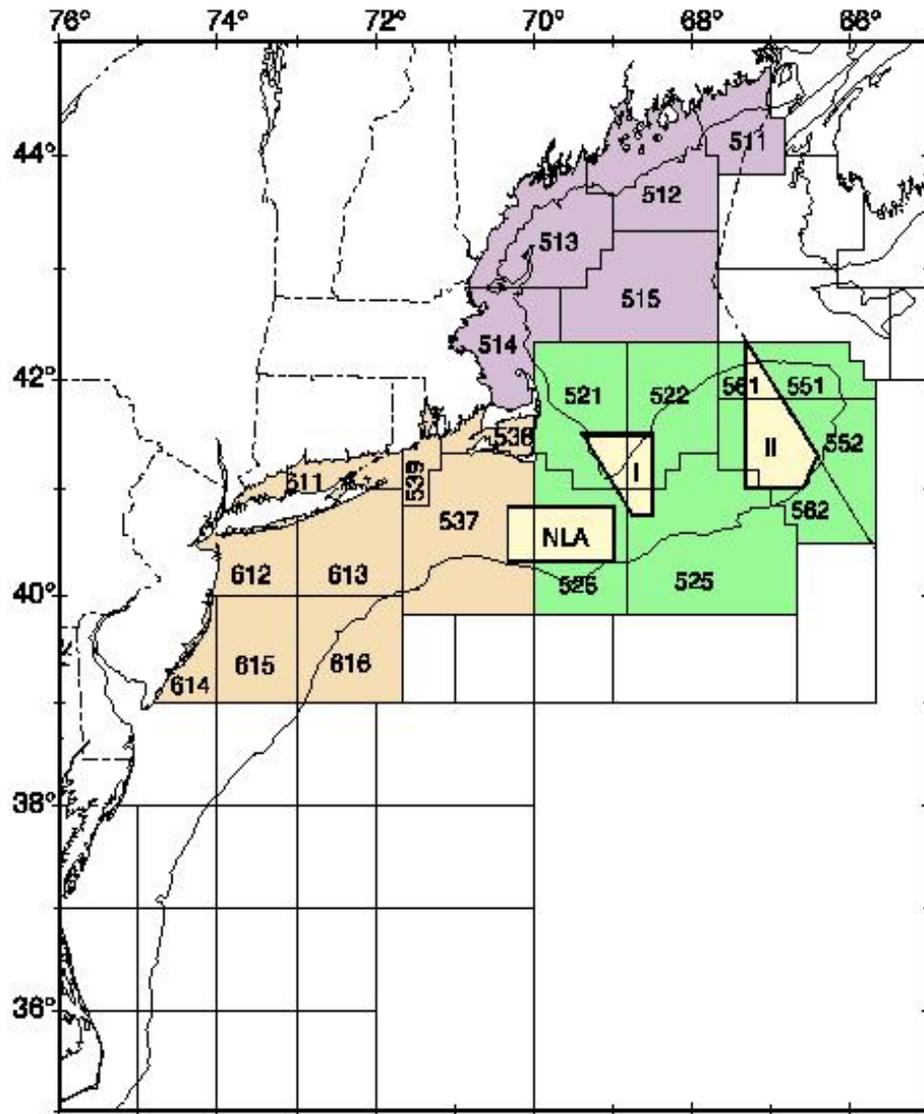
Never got down to  $F_{MSY}$  (0.25)



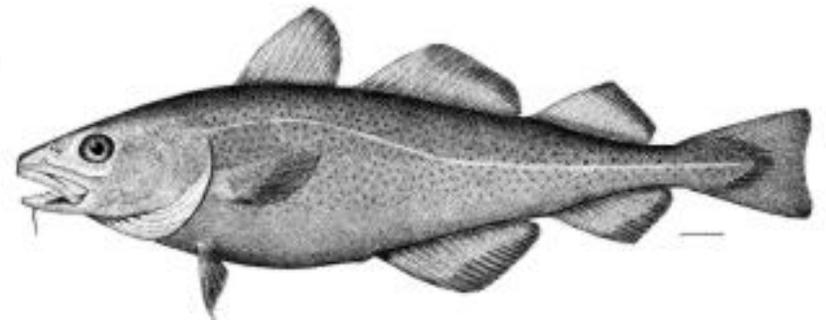
# VPA Results – SSB Increased but well below $SSB_{MSY}$ (58.8 kt)



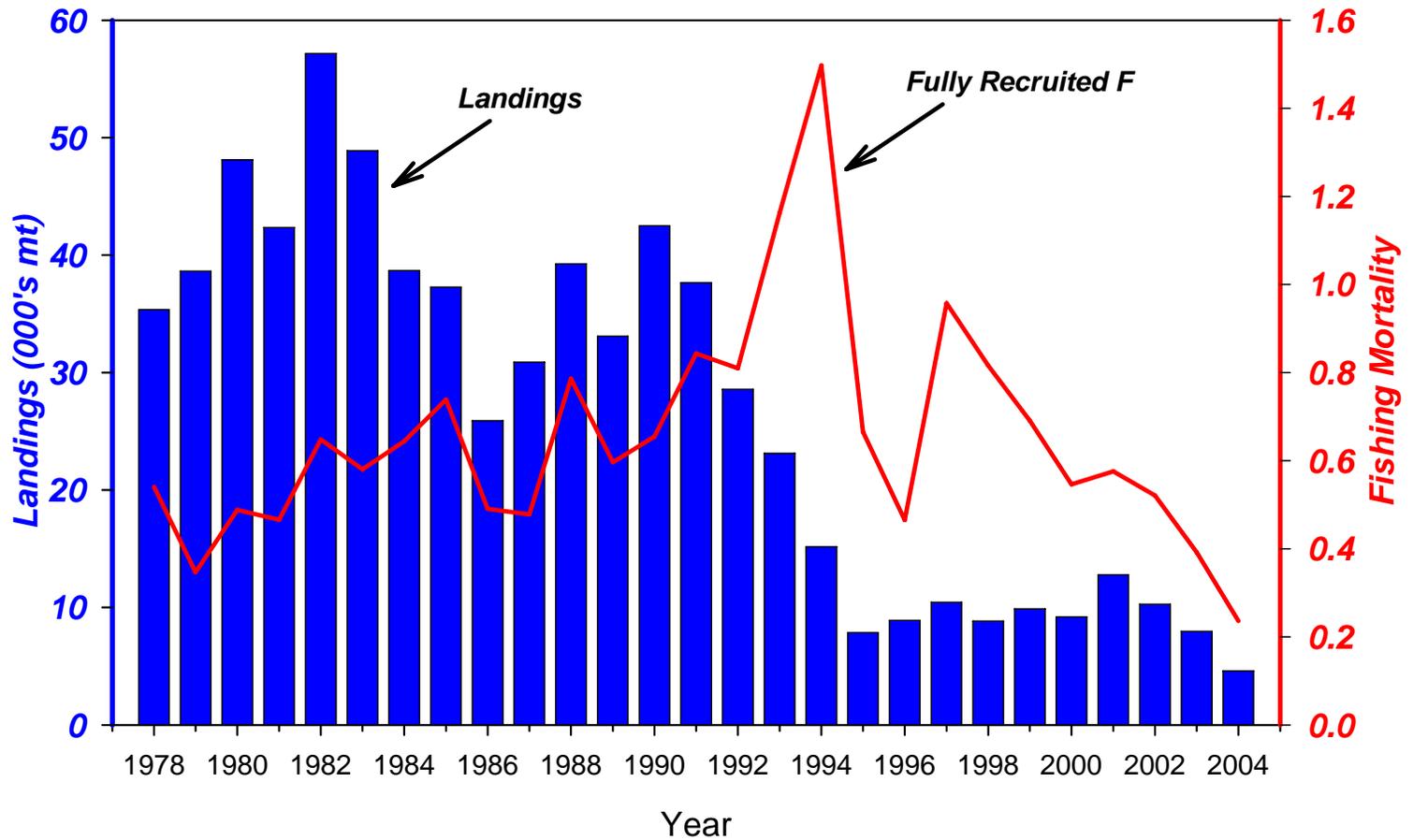
## Atlantic Cod Assessment Area



## *Georges Bank Cod*

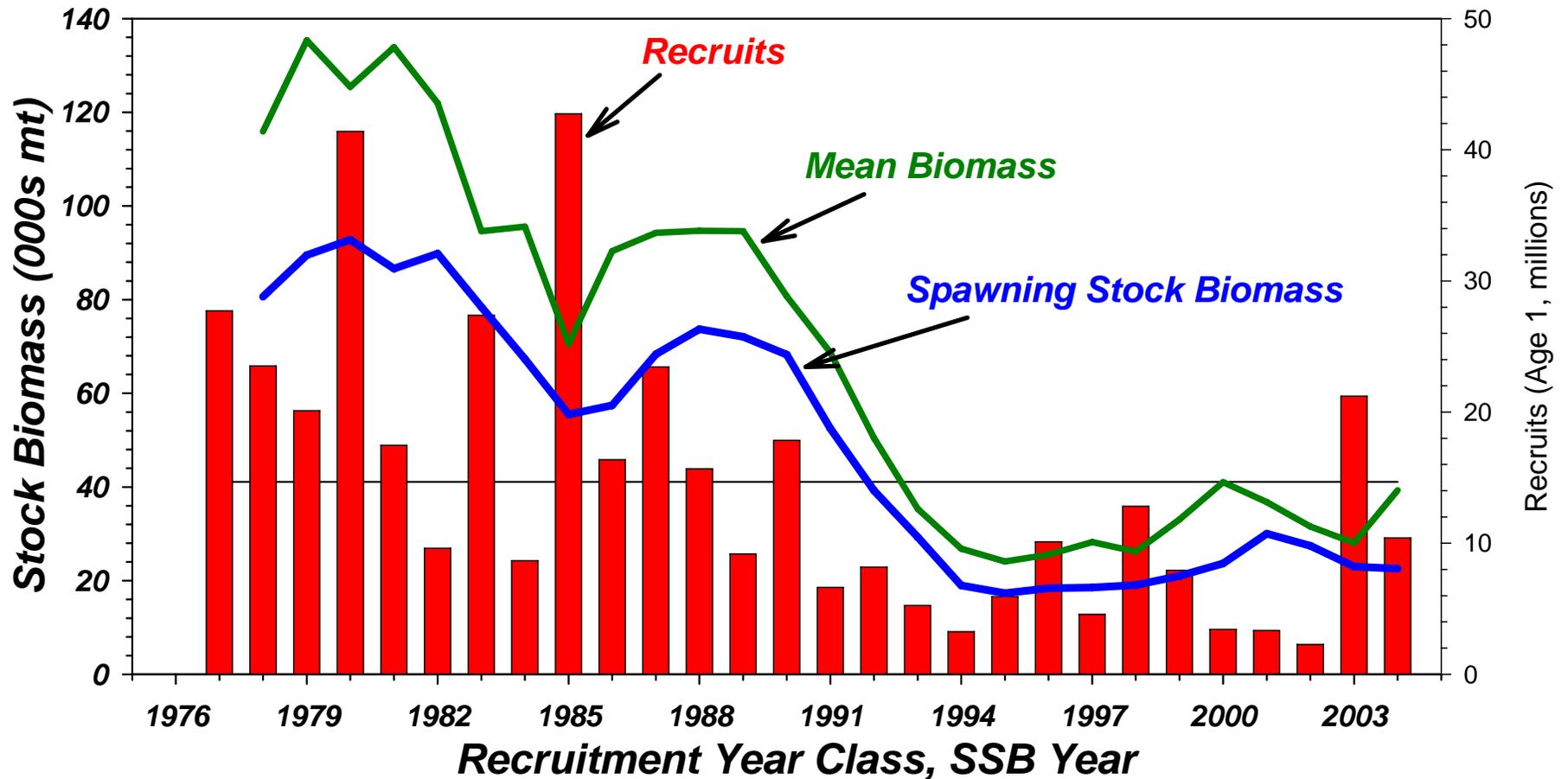


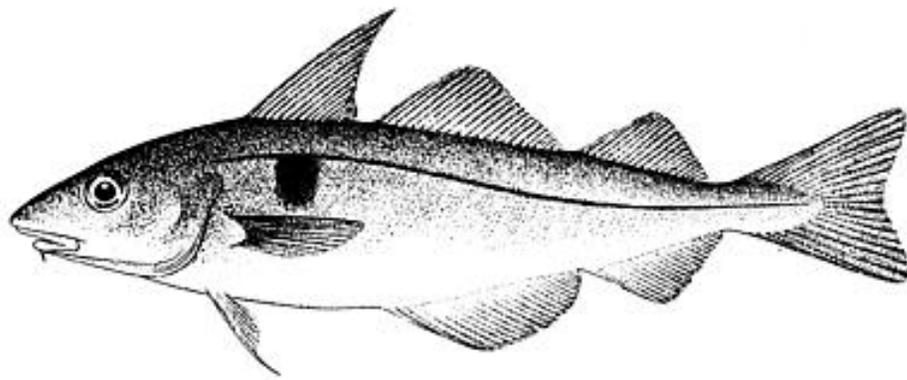
# Georges Bank Cod



F 2004 = 0.24

# Georges Bank Cod Spawning Stock Biomass and Recruitment





**Georges Bank  
Haddock**

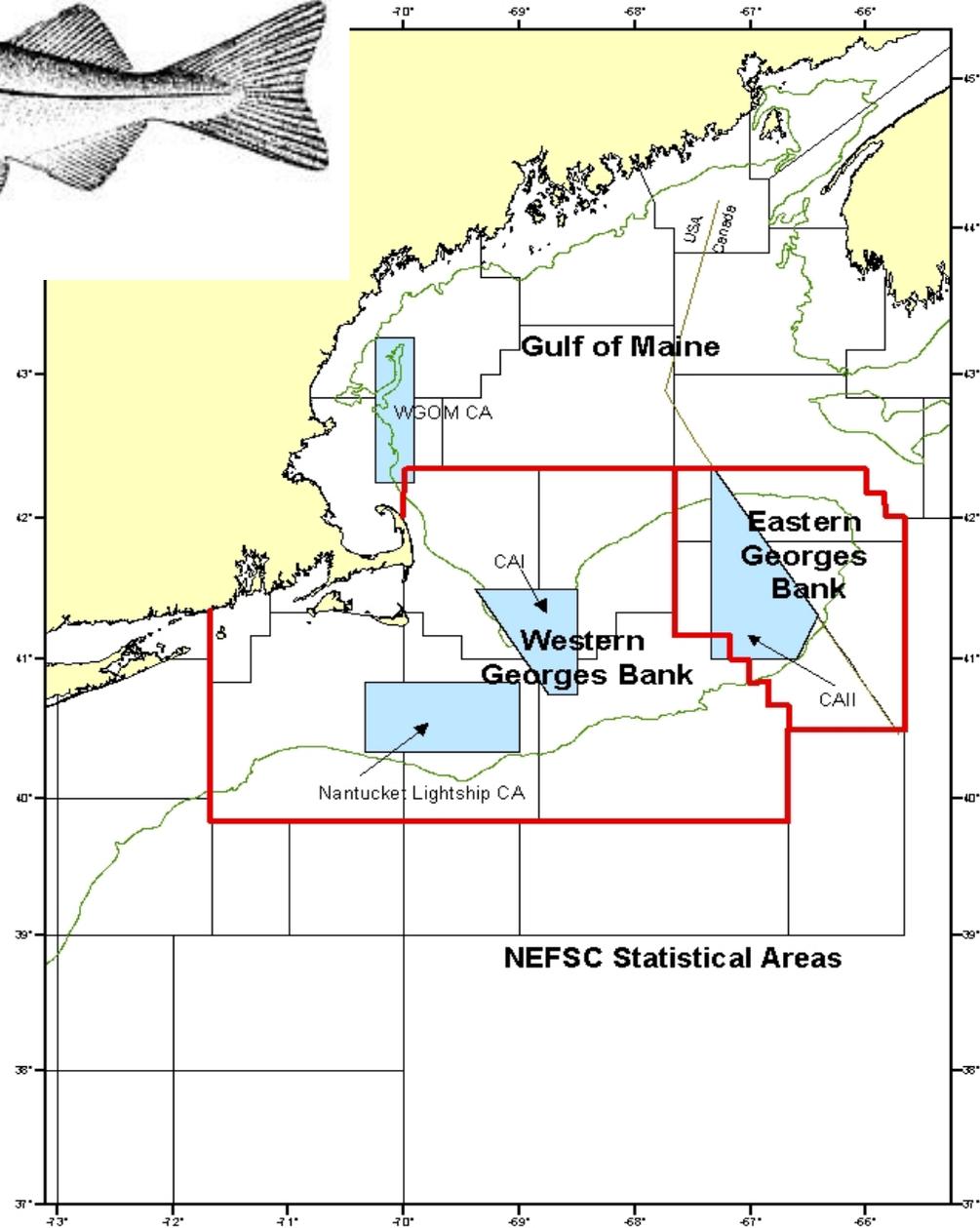


Figure B8. Trends in spawning stock biomass (line) and recruitment (bars) for Georges Bank haddock from 1931-2004.

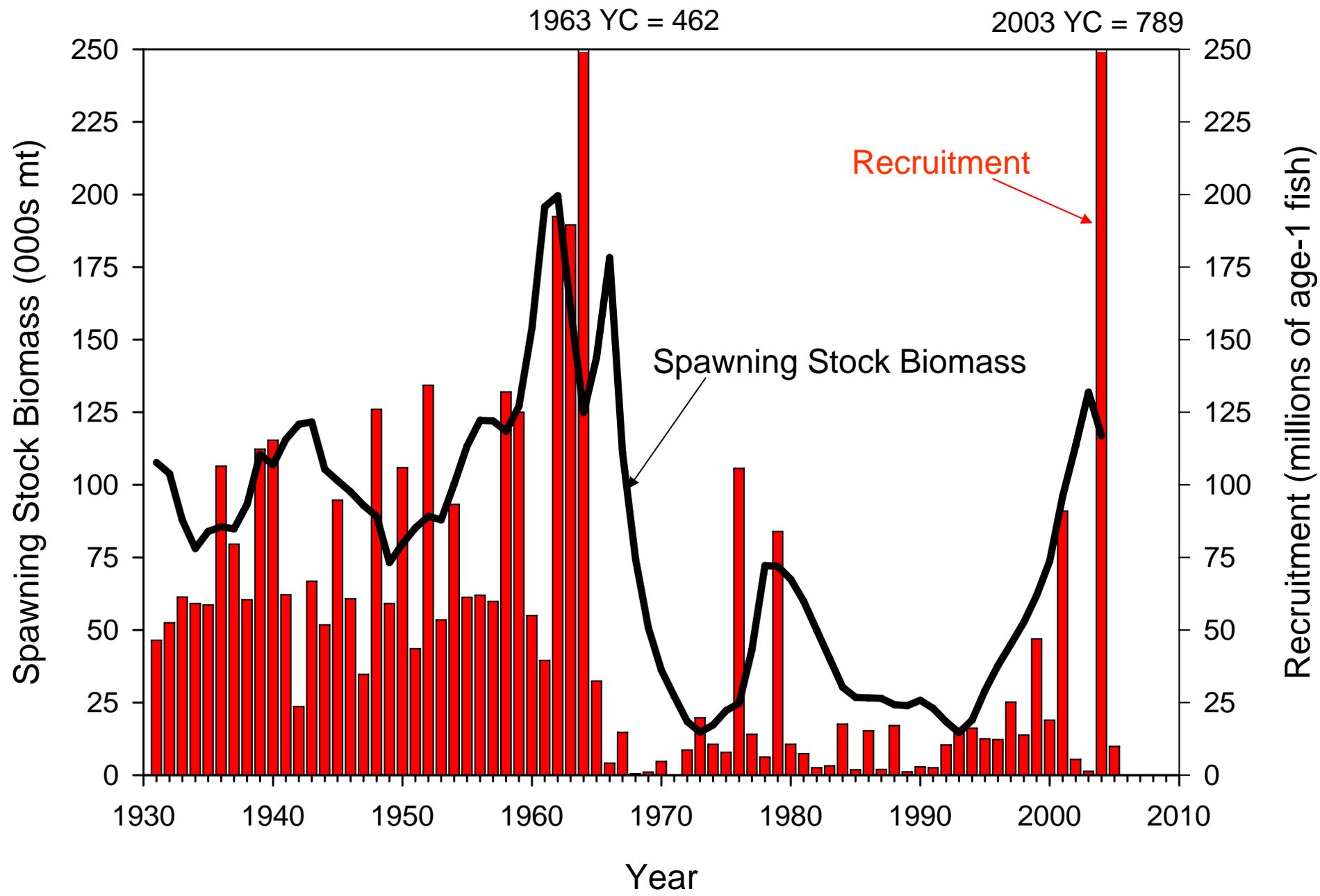
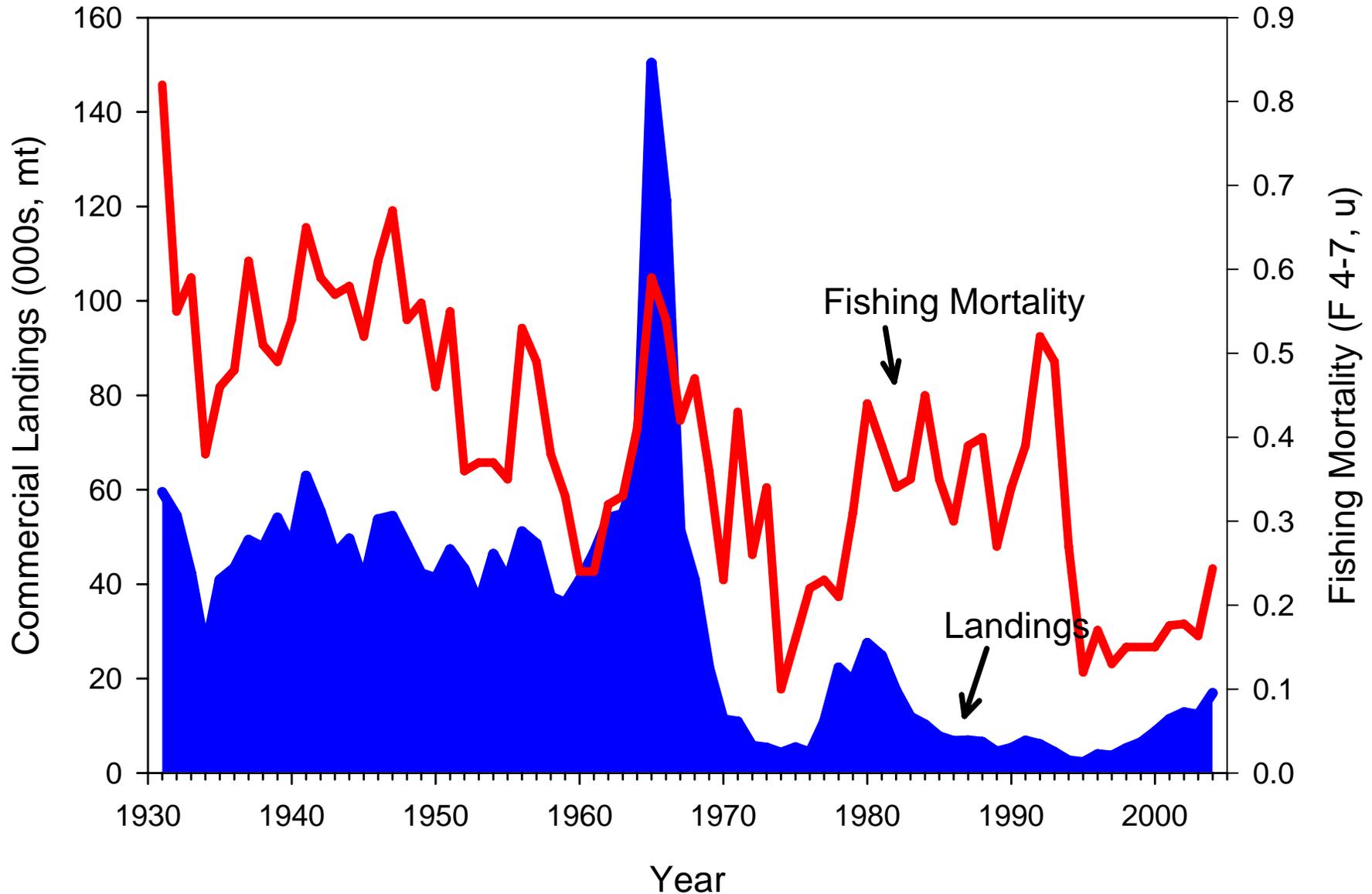
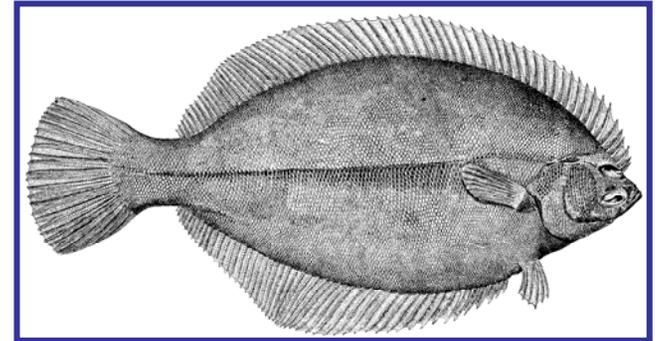
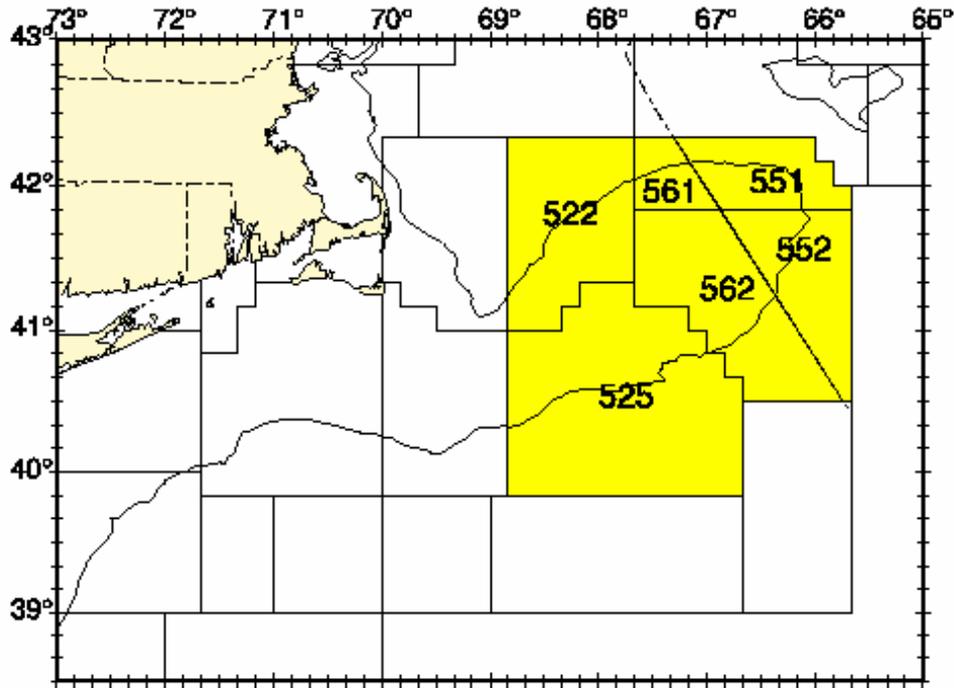


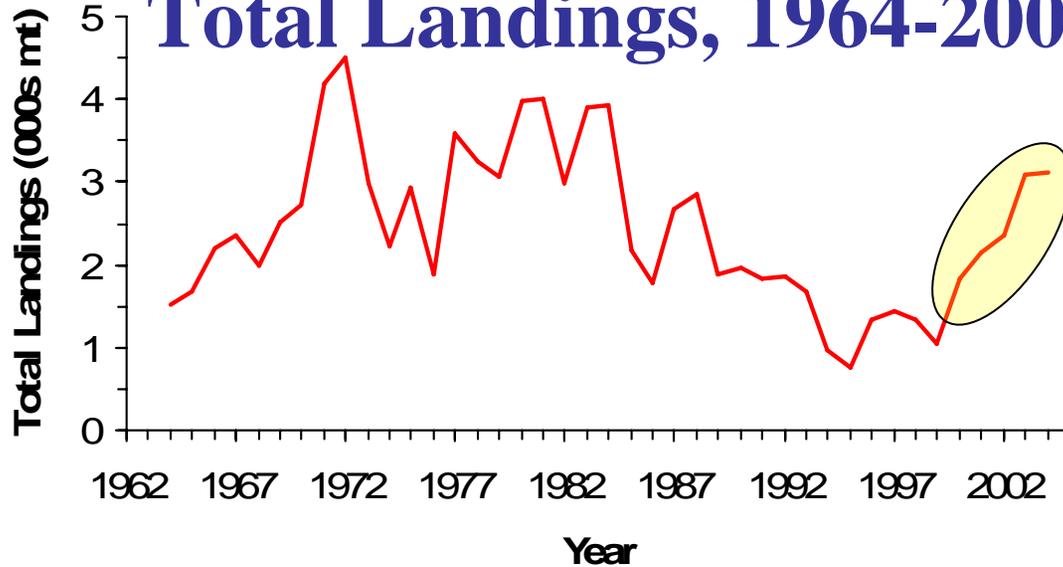
Figure B9. Trends in commercial landings (thousand mt, live weight) and fishing mortality (unweighted mean, ages 4-7) for Georges Bank haddock from 1931-2004.



# Georges Bank Winter Flounder

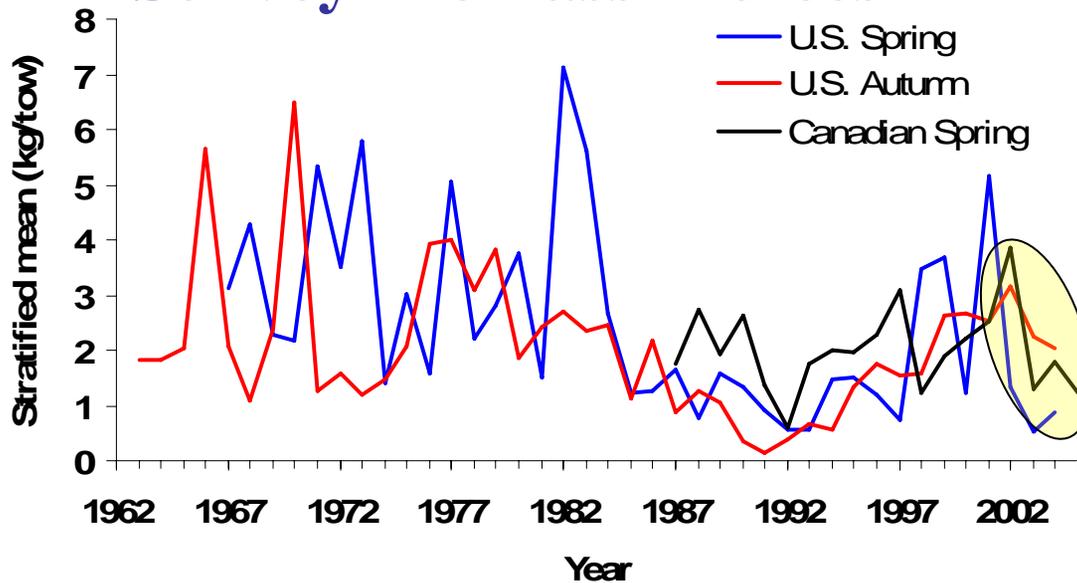


# Total Landings, 1964-2004

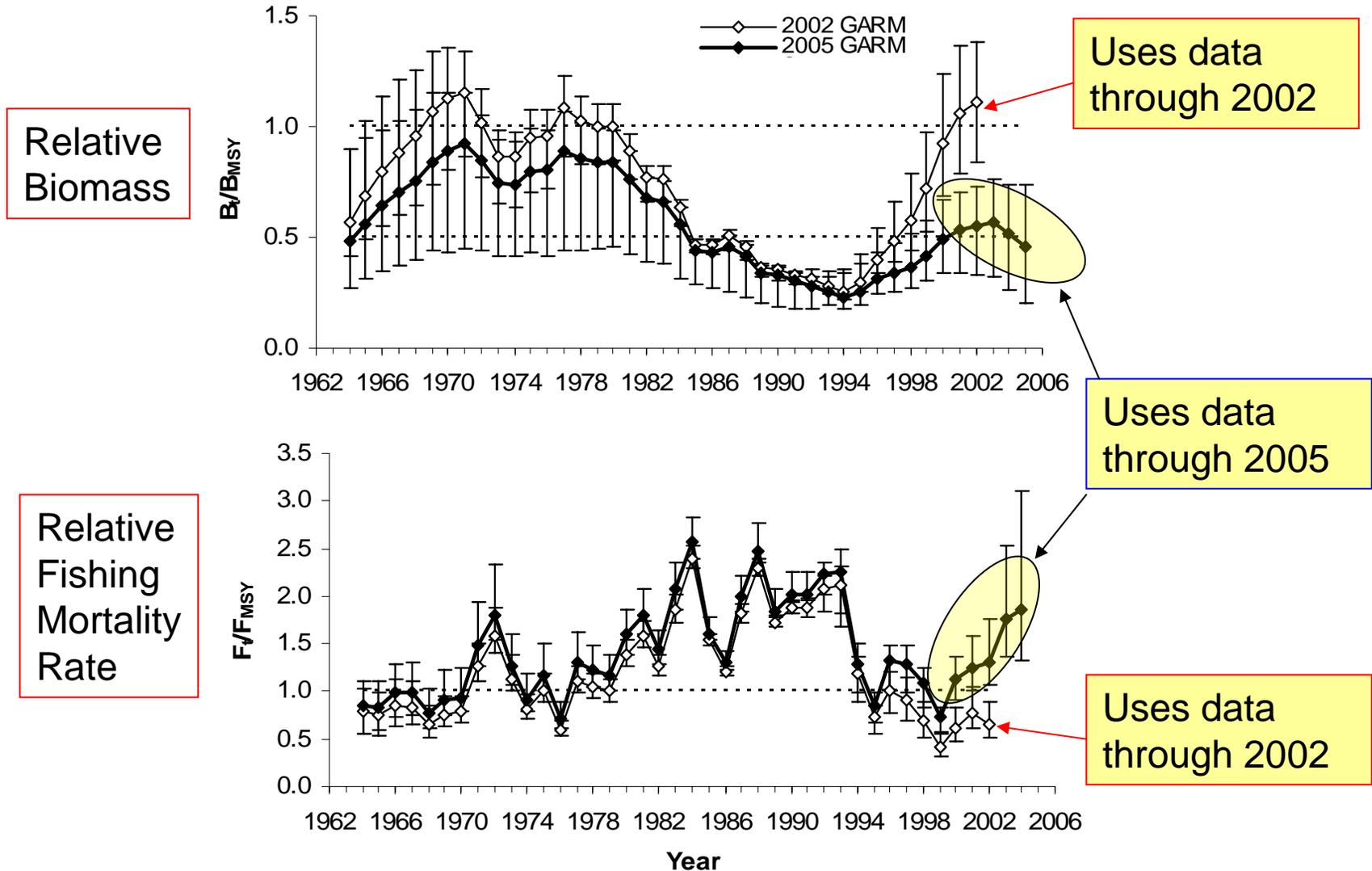


**Stock abundance indices began to decline in 2002 as landings continued to increase. This suggests that the stock is not as productive as the previous data had indicated. Thus FMSY is estimated to be lower.**

# Survey Biomass Indices



Bias-corrected estimates of (A) relative total biomass ( $B_t/B_{MSY}$  on Jan. 1), during 1964-2005, and (B) relative fishing mortality rates ( $F_t/F_{MSY}$ ), during 1964-2004, for the 2002 and 2005 ASPIC model runs for Georges Bank winter flounder. Error bars represent bias-corrected 80% confidence intervals.



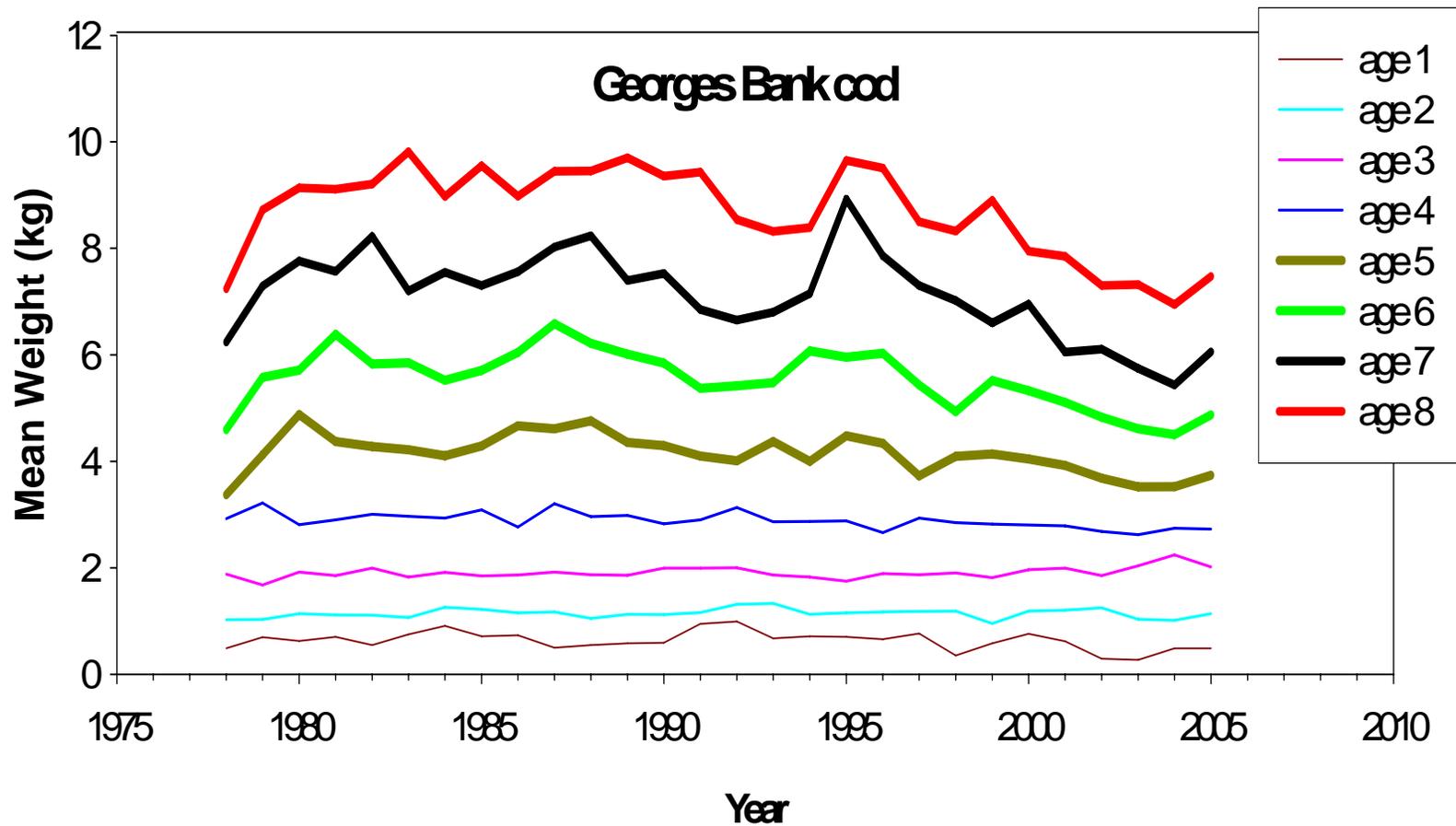
# Comparison of Bias-Corrected Parameters for Georges Bank Winter Flounder

Parameter	Terminal Year	
	2002	2005
$F(t)/F_{MSY}$	0.76	1.86
$B(t)/B_{MSY}$	1.04	0.52
$F_{MSY}$	0.31	0.22
$B_{MSY}$ (mt)	8,746	10,136
MSY (mt)	3,027	3,112

# Changes in Average Weight at Age

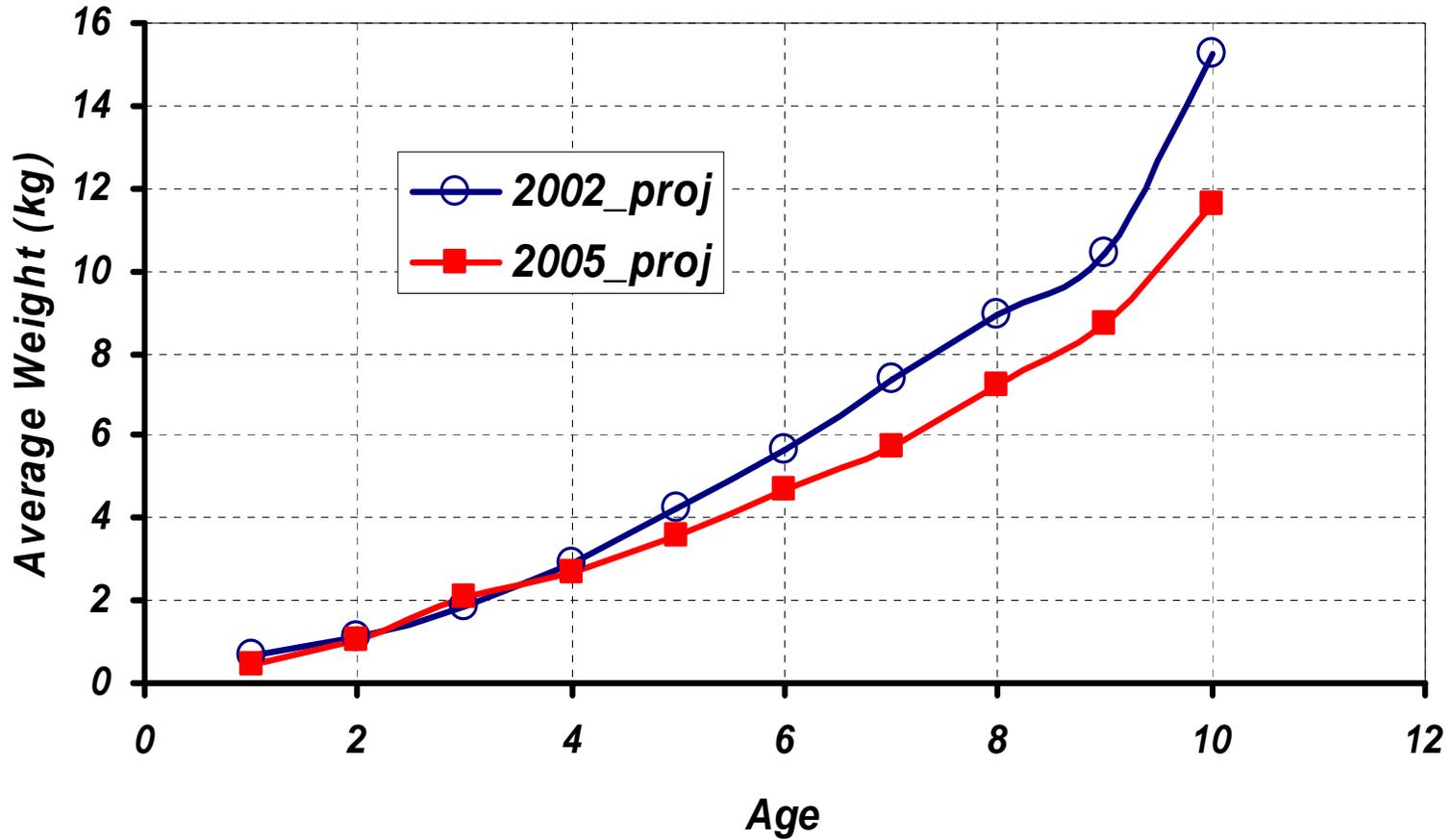
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- Reductions in average weight at age are evident for a number of stocks
  - Georges Bank Cod and Haddock
  - Gulf of Maine Winter flounder, Plaice, and Witch flounder
- Appear for stocks at both high and low abundance levels
- **Causal mechanisms unknown but could include**
  - Environmental change
  - Density dependence
  - Earlier maturation/genetic selection
  - All of the above and more
- **Implications if patterns persist**
  - *Lower yields*
  - *Slower rebuilding*
  - *Possible changes in rebuilding targets when re-evaluated in 2008*

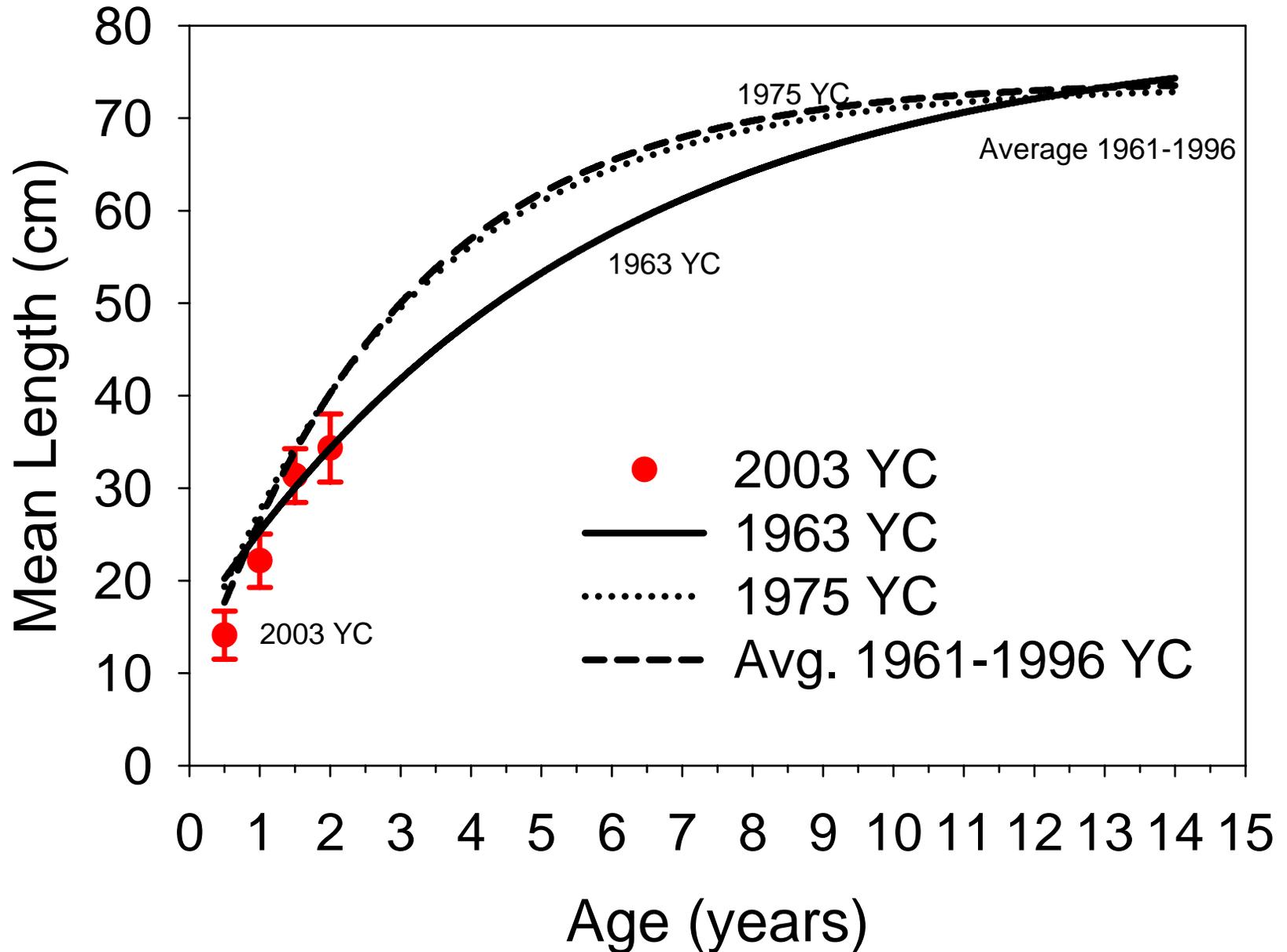


Jan. 1 Mean weights

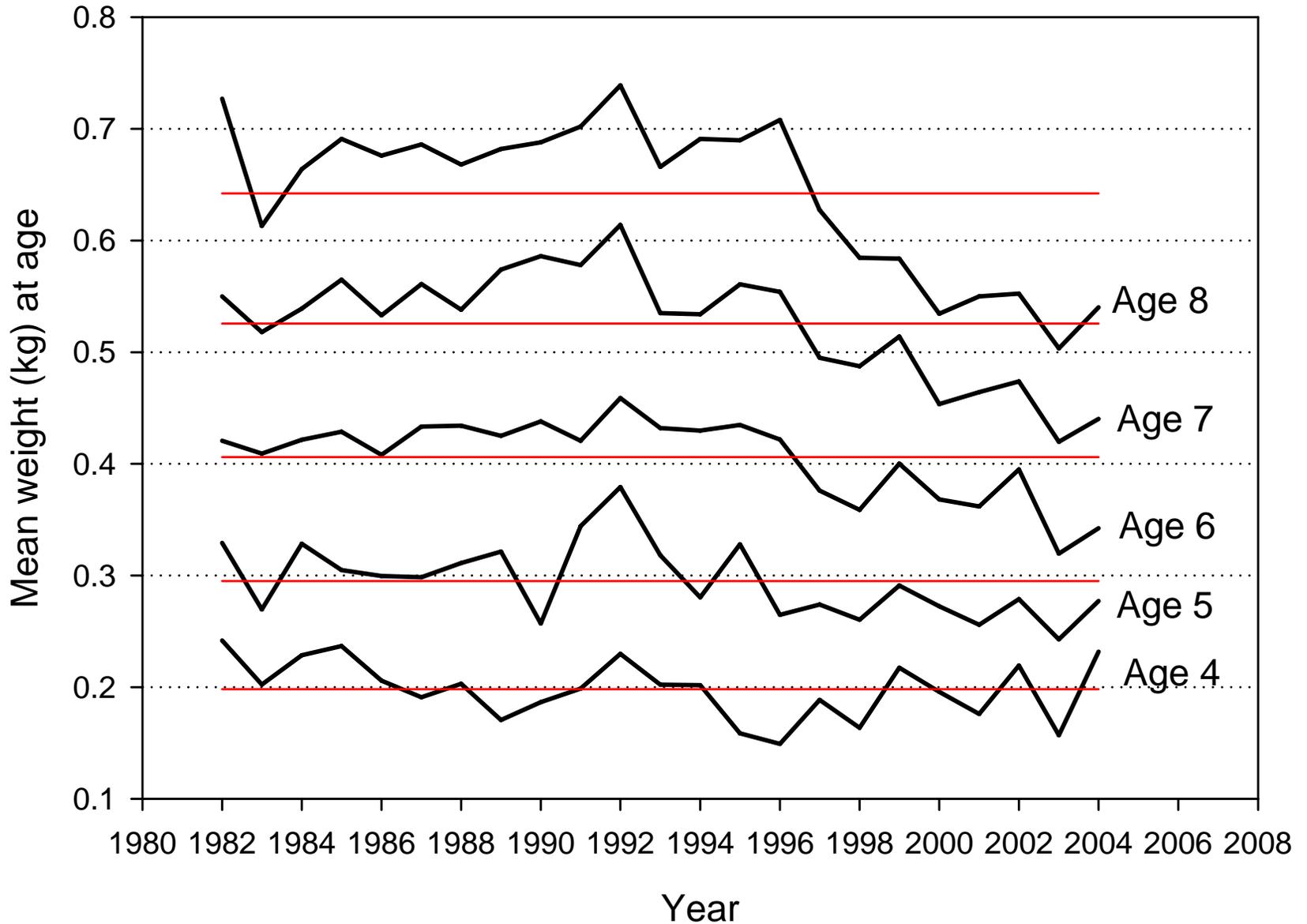
# Stock weight – GB cod



# Georges Bank Haddock Size at Age by Year Class



# *Witch flounder mean weights at age in the catch*



# *What is a retrospective pattern? (1)*

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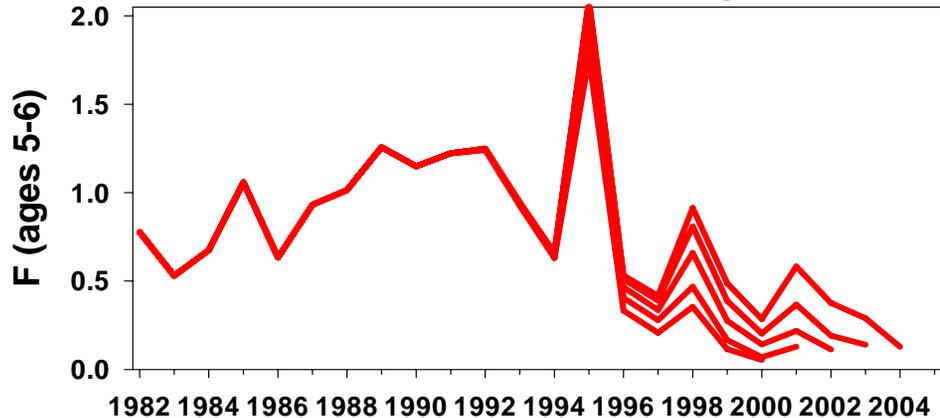
- **A consistent change in estimated quantities that occurs when additional years of information are added to a model.** Fishing mortality, Spawning Stock Biomass, or Recruitment
- Not a generic property of VPA, other models exhibit same properties
- Not evident for all stocks assessed by the GARM
- Provides insight into change in underlying process:
  - missing landings,
  - unobserved discards,
  - increased natural mortality,
  - changes in survey catchability.

## *What is a retrospective pattern? (2)*

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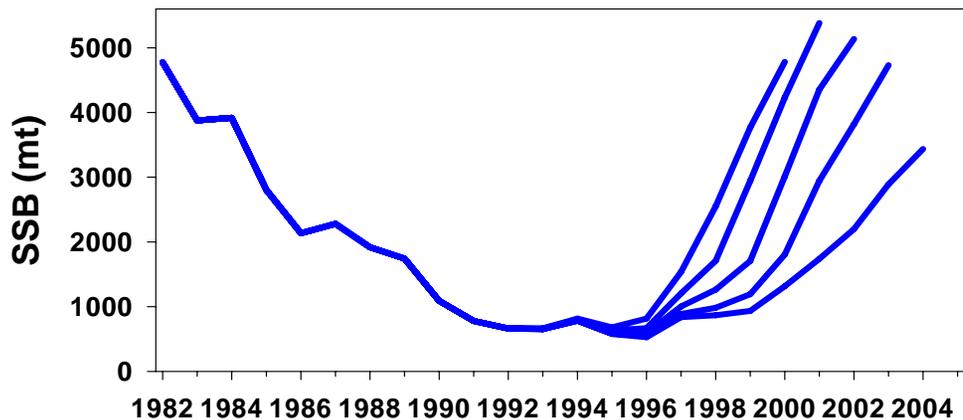
- When a persistent pattern of underestimation of  $F$  and overestimation of SSB occurs, reductions in projected landings may be required to achieve projected rebuilding trajectories.
- No general agreement on how to “correct” for problem.
- Multiple models can provide guidance

### Gulf of Maine winter flounder retrospective VPAs

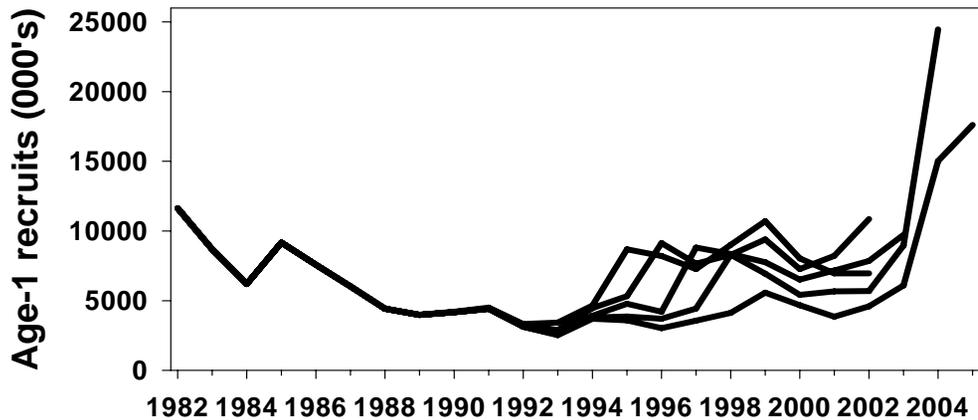


### Gulf of Maine Winter Flounder

*Fishing Mortality on fully-recruited ages 5 and 6*

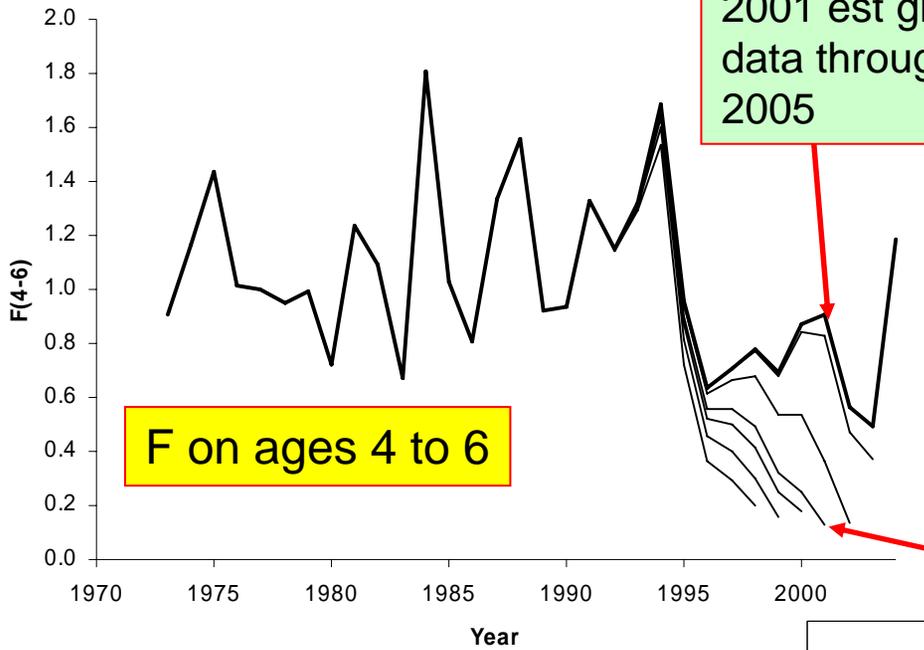


*Spawning Stock Biomass*

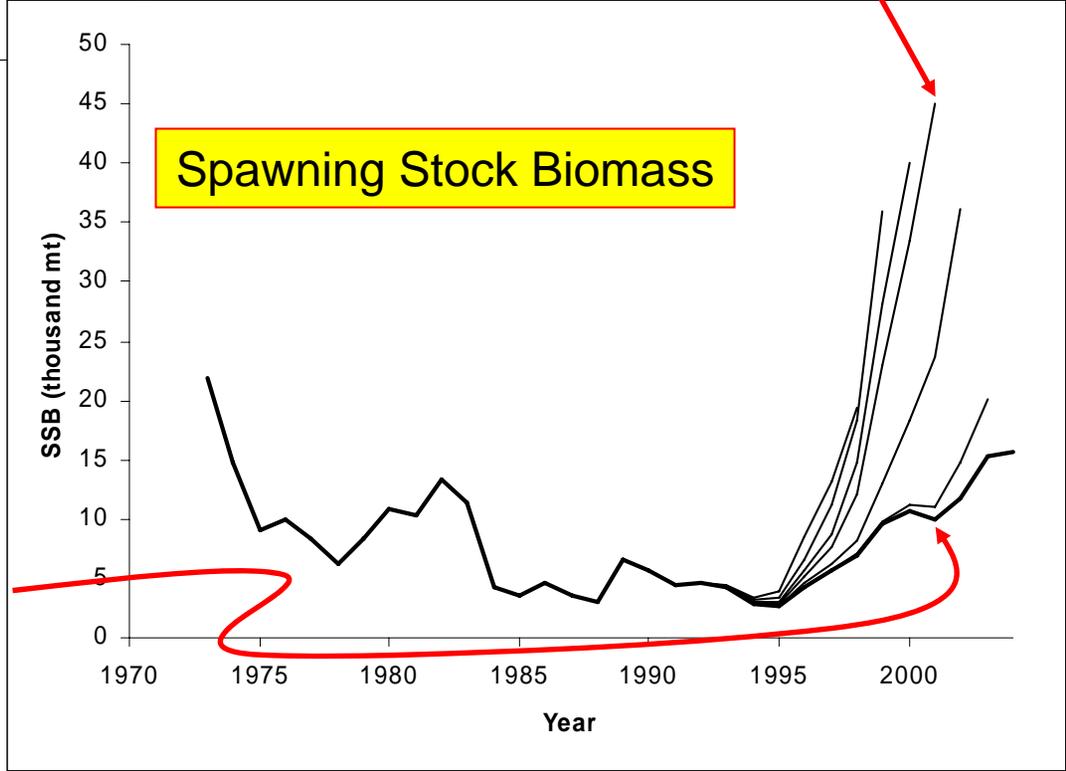


*Age 1 Recruits*

# ***GB Yellowtail Retrospective (Base Model)***

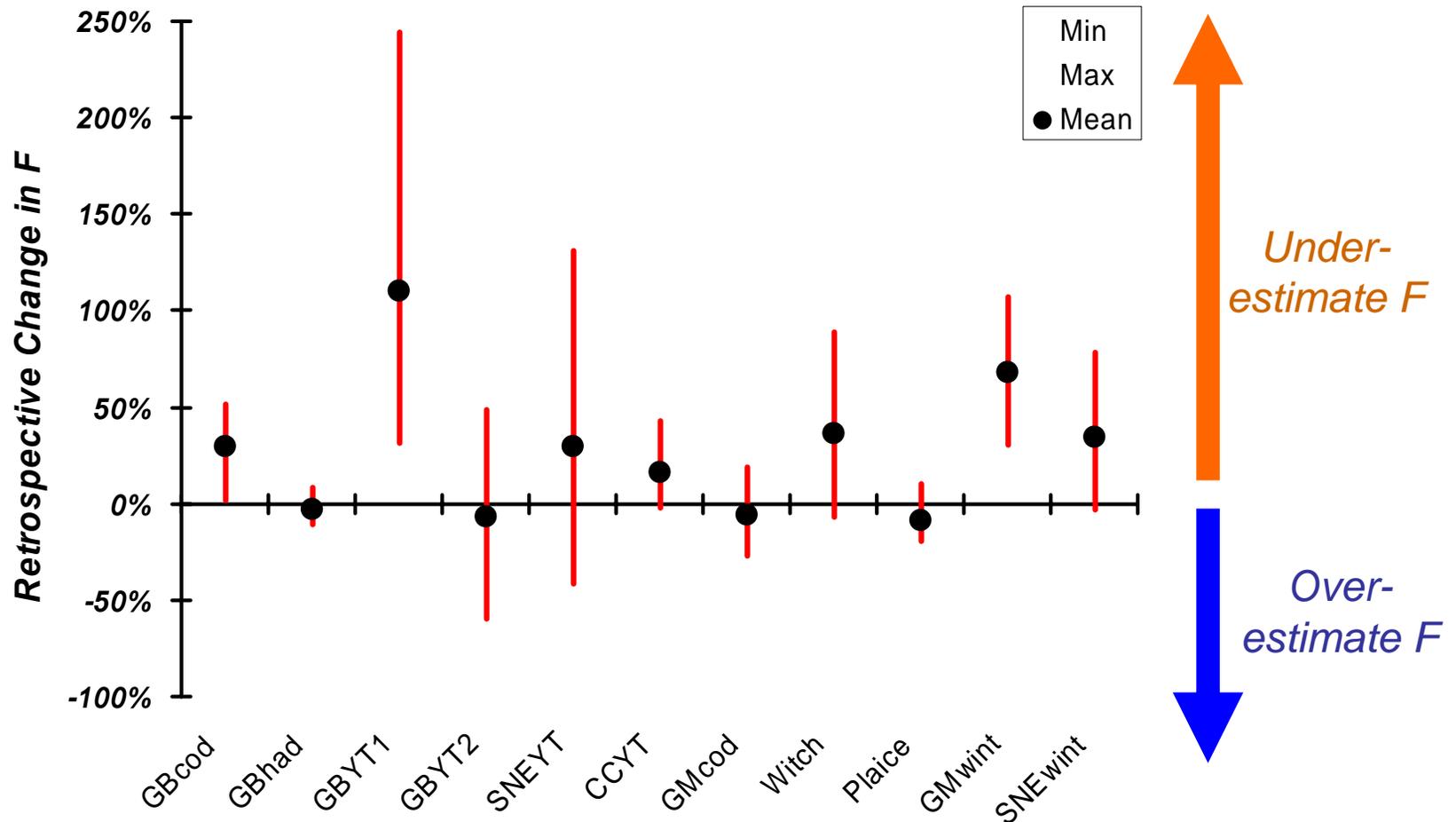


2001 estimate given data through 2002



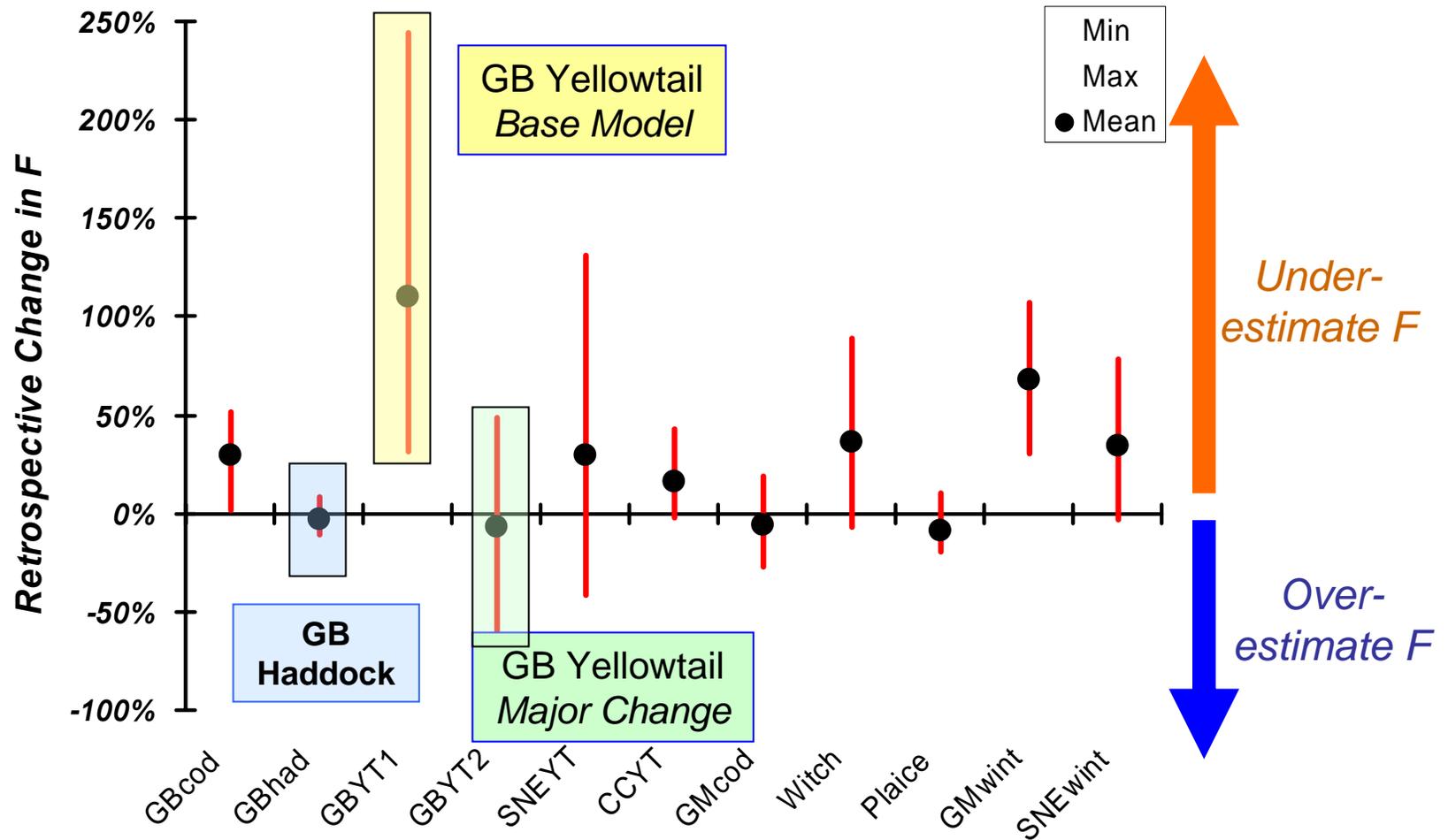
# Retrospective Pattern in F

Average and range of relative changes in estimates of  $F$  for successive increases in the number of years included, (2000-2004).



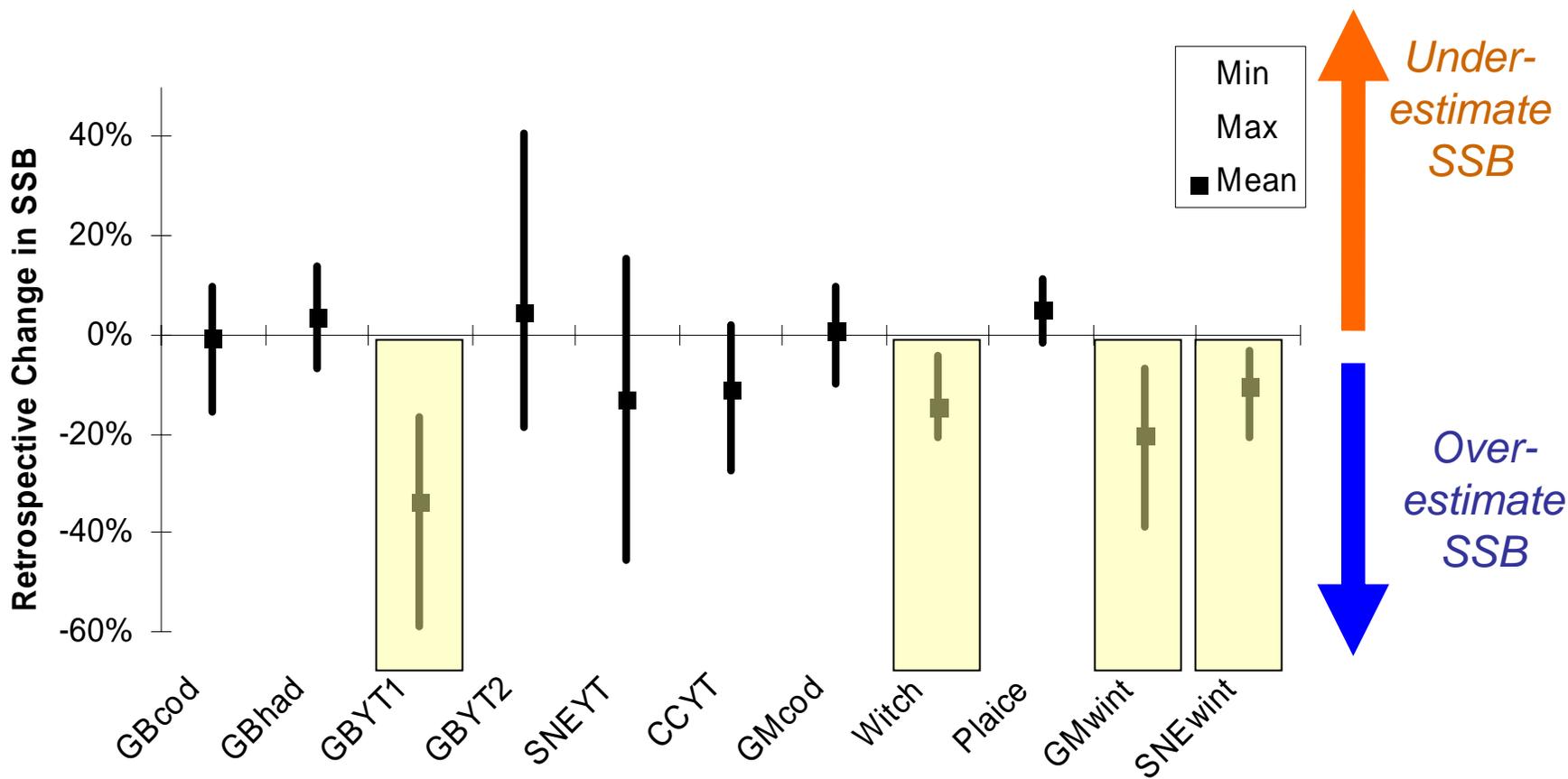
# Retrospective Pattern in F

Average and range of relative changes in estimates of  $F$  for successive increases in the number of years included, (2000-2004).



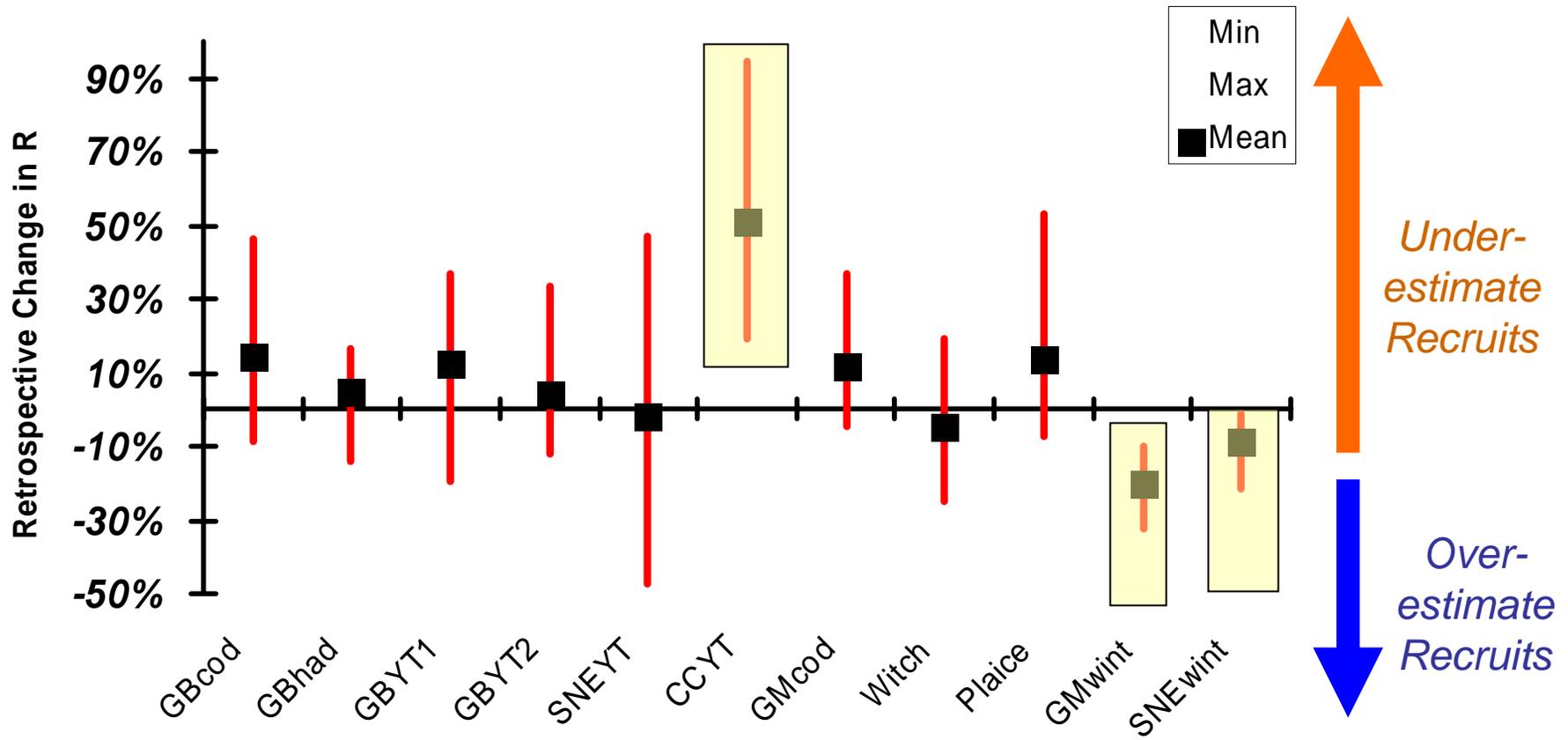
# Retrospective Pattern in Spawning Stock Biomass

Average and range of relative changes in estimates of SSB for successive increases in the number of years included, (2000-2004).



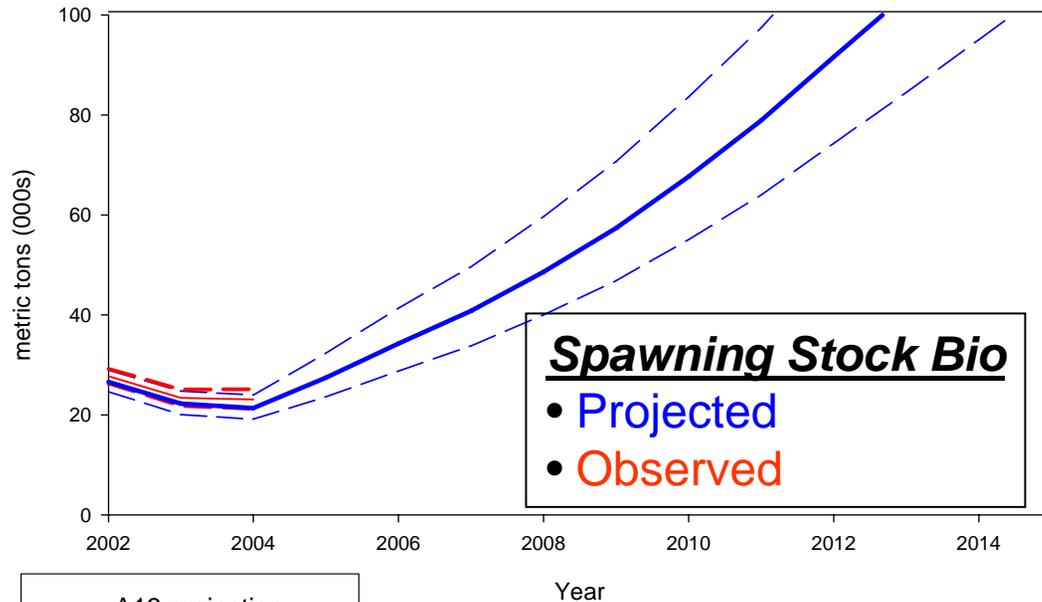
# Retrospective Pattern in R

Average and range of relative changes in estimates of Recruitment for successive increases in the number of years included, (2000-2004).



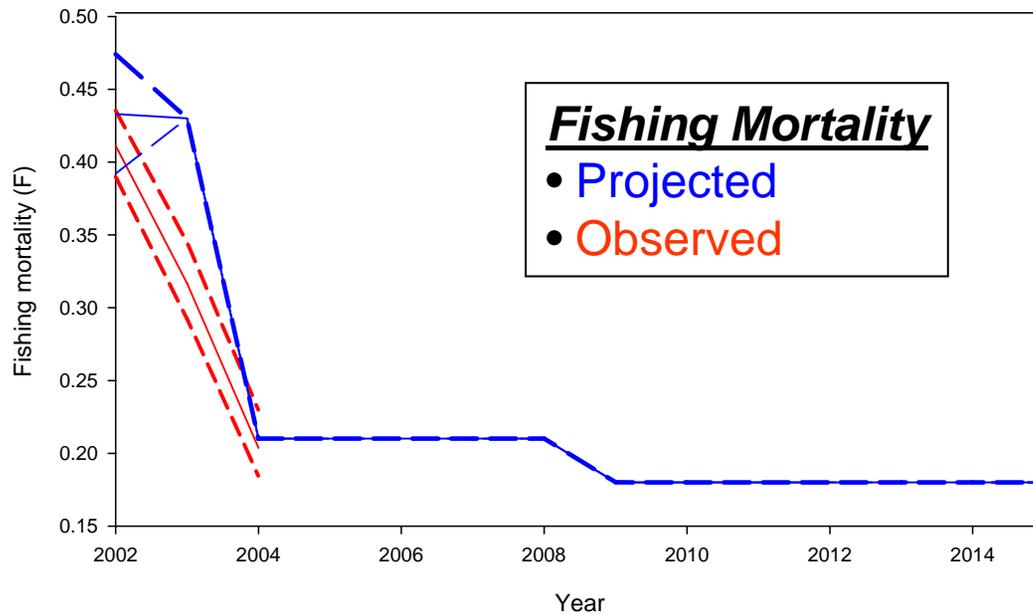
# Comparisons with Projections

# GB Cod Spawning Stock Biomass

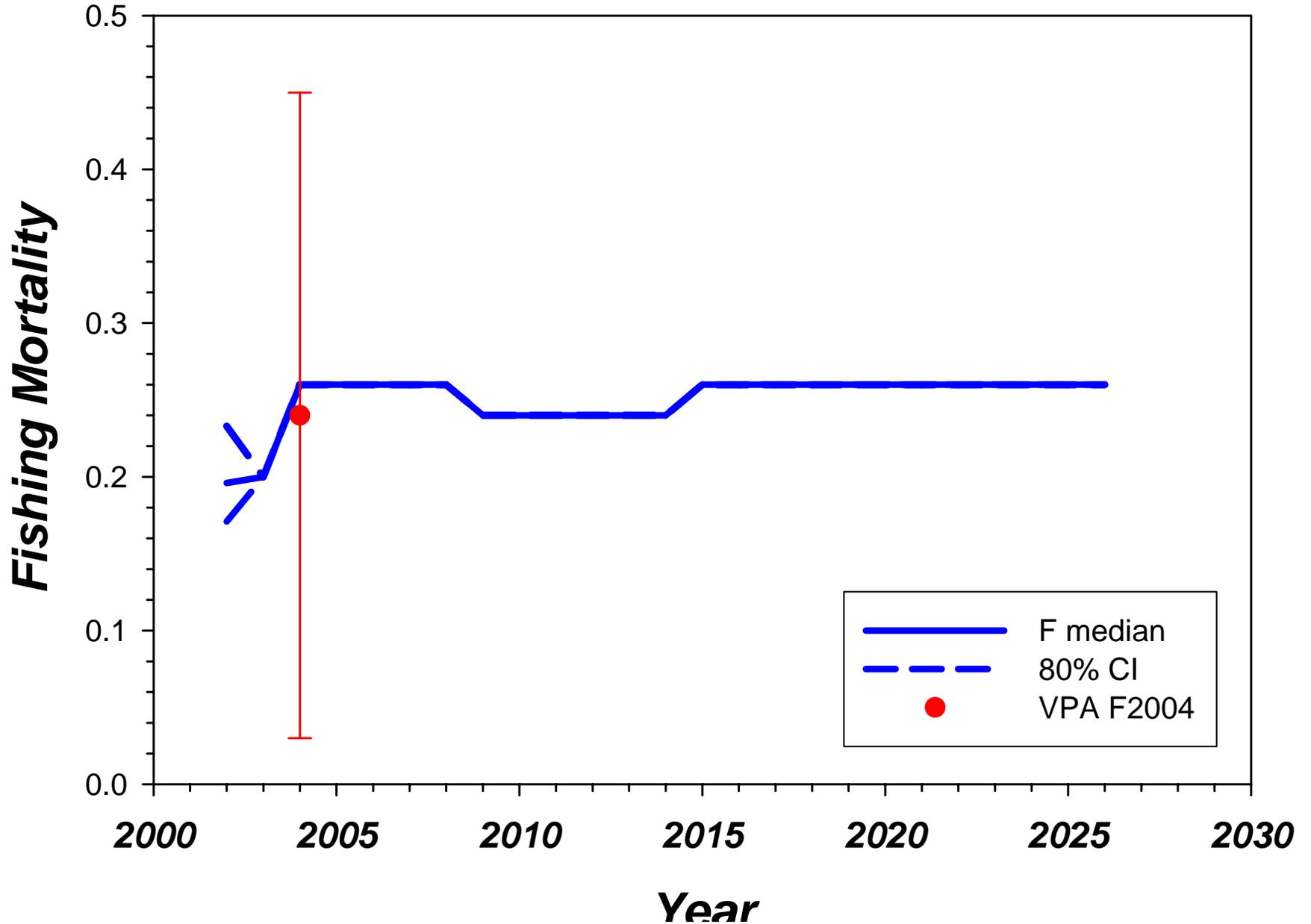


**Georges Bank  
Cod:  
Comparisons of 2002  
GARM Projections with  
Estimates from 2005  
GARM II**

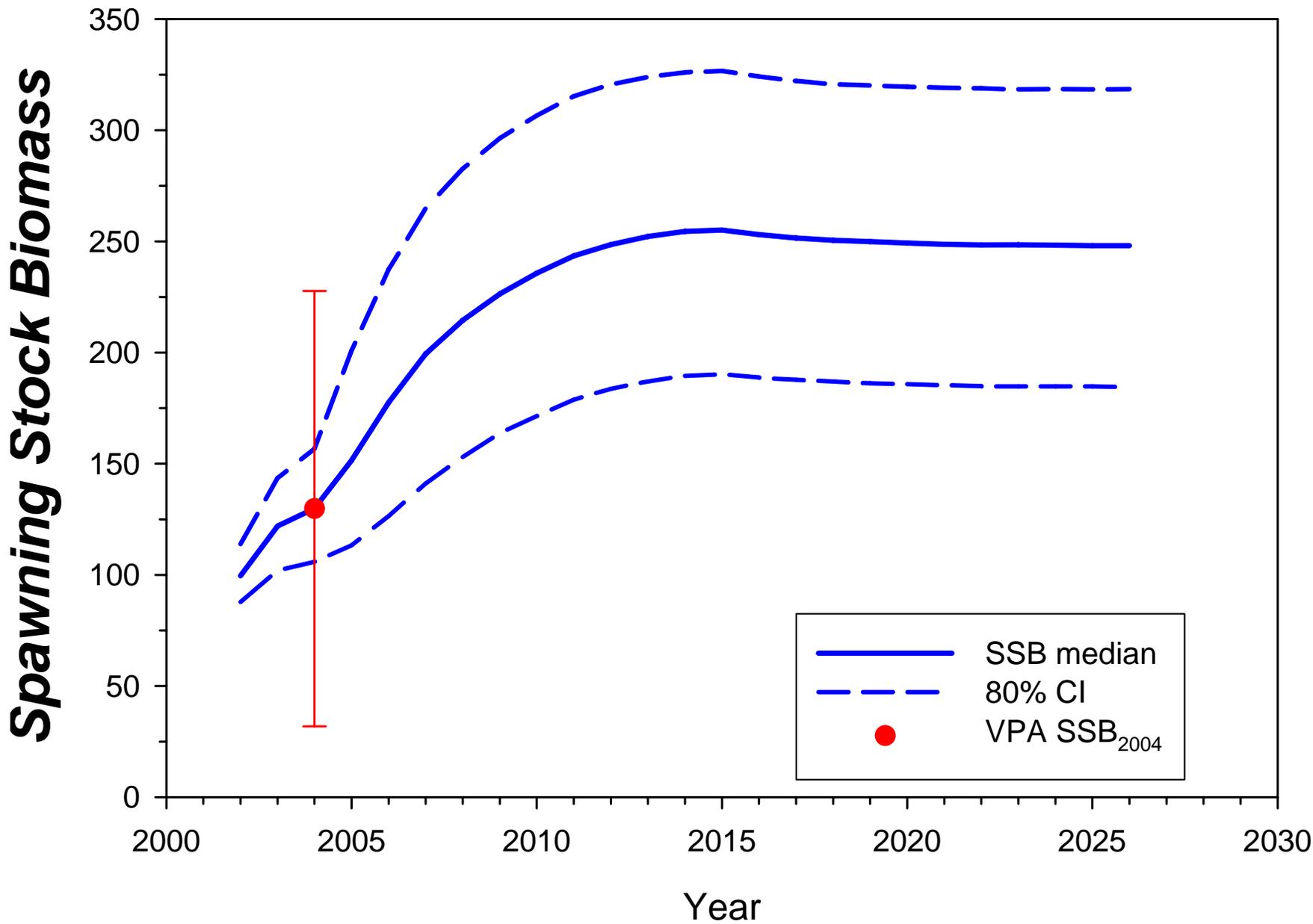
## Fishing Mortality



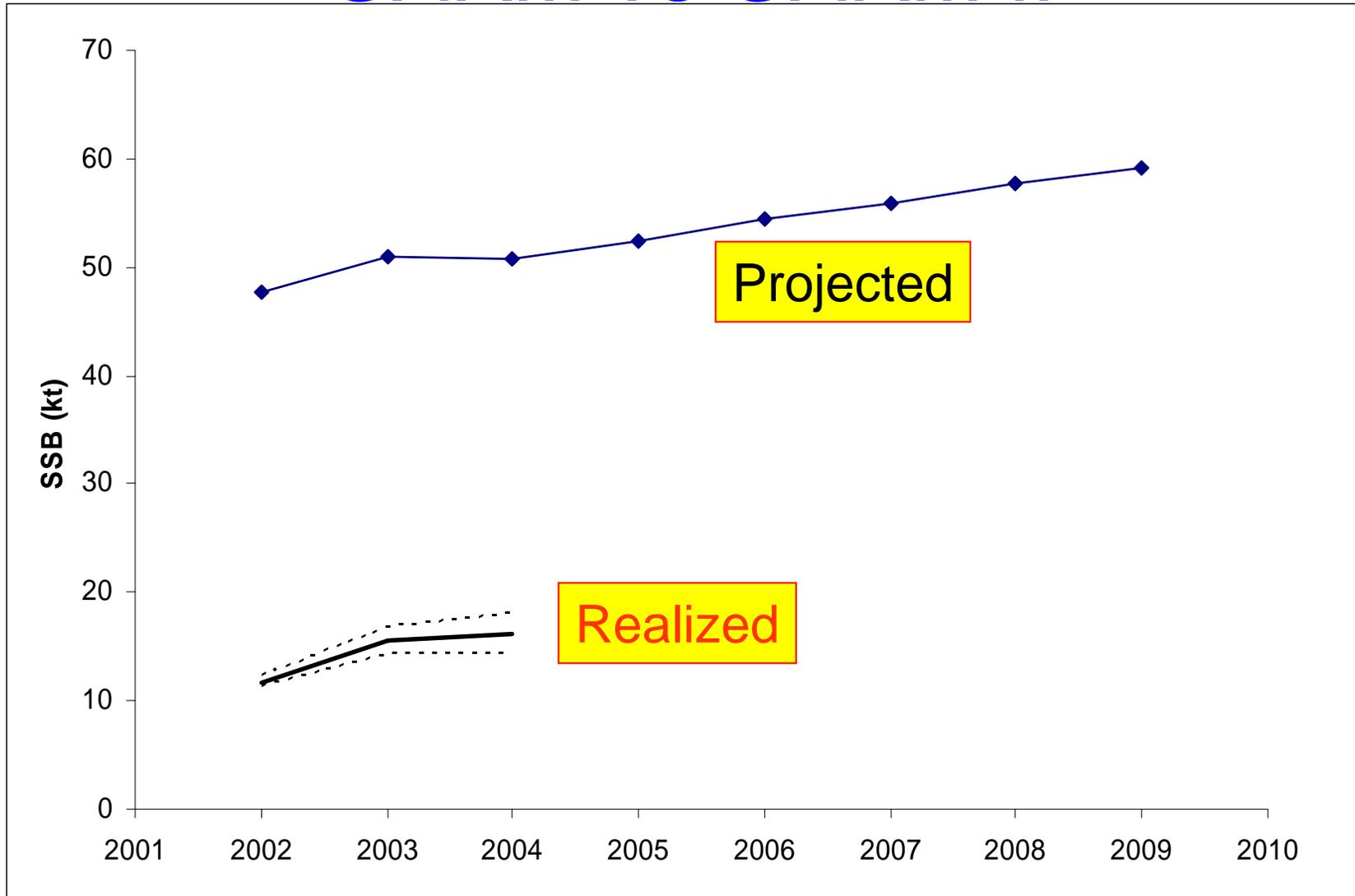
# Georges Bank Haddock Adaptive Rebuilding Plan Fishing Mortality, 2002-2026



# Georges Bank Haddock Adaptive Rebuilding Plan Spawning Stock Biomass, 2002-2026



# Georges Bank Yellowtail Flounder SSB GARM vs GARM II



# Projected and Realized Landings: See Table 3.2

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- In 2004, realized landings were less than projected for all stocks except
  - GB Cod (+16%),
  - GOM Cod (+22%),
  - White Hake (+55%)
- From 2002 to 2004, overall landings were 18% less than projected.

# *2004 Landings Issues--*

*Problems were encountered and resolved,  
but necessary improvements include:*

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- Linkage between Dealer records of landings and Vessel Trip Reports for gear type. (Gear type is necessary to prorate landings to stock area)
- Identification of trips in Special Access Programs and US Canada Resource Sharing Area. (Multiple databases now required)
- Timeliness and completeness of Dealer records during transition to Electronic Dealer Reporting

# Summary

## Promising Trends/ Causes for Concern

- **Promising Trends**

- Reductions in F for 13 stocks
- Very strong recruitment of haddock
- Some evidence of a better than average 2003 yearclass of cod
- Evidence of rebuilding in 6 stocks
- Met most landings targets

- **Causes for Concern**

- Overfishing on 8 stocks
- Lack of rebuilding in cod and other stocks
- Retrospective patterns, especially for GB Yellowtail, GB Winter flounder
- Decrease in Average Weights

END